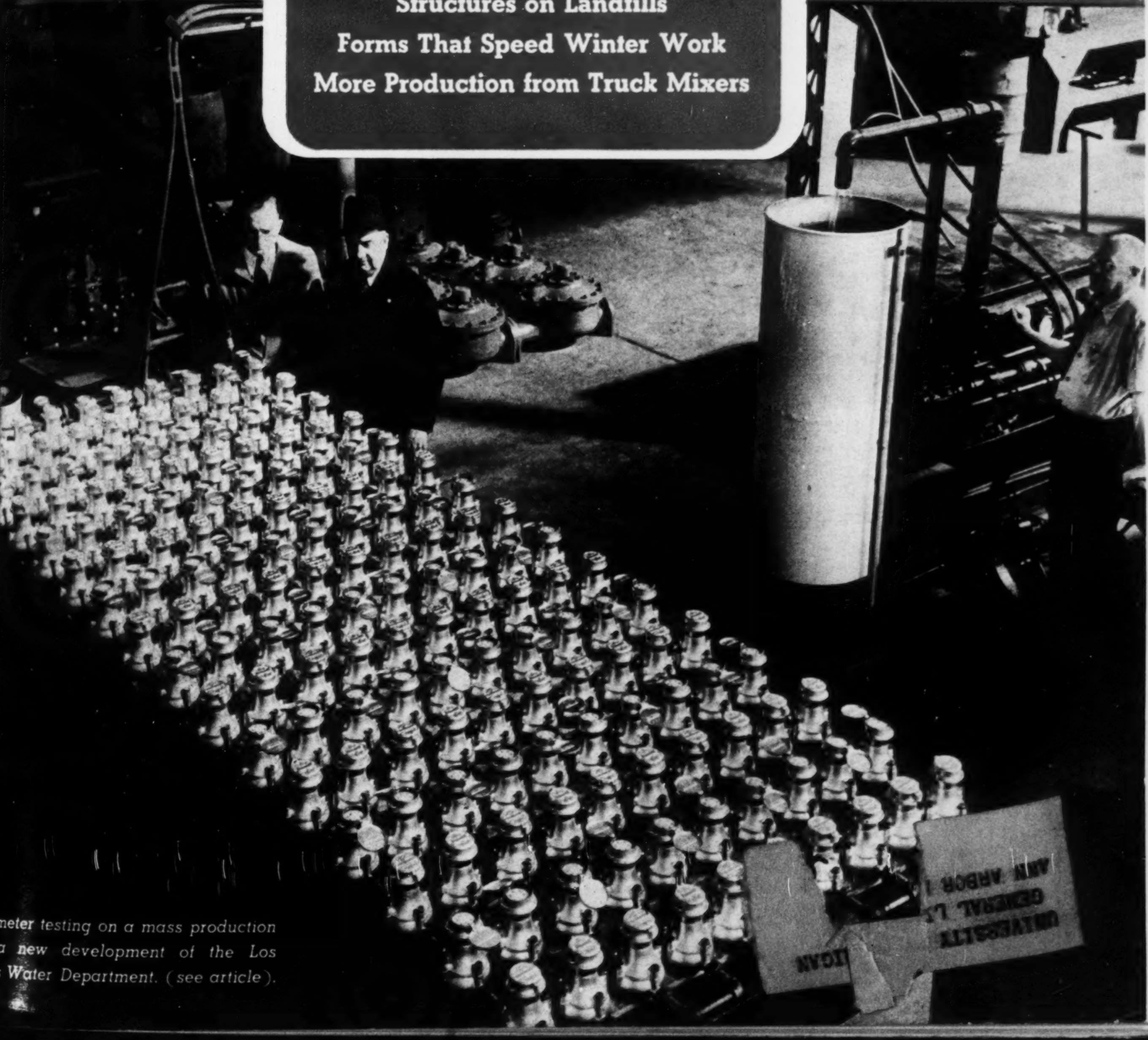
SEP 14 1942

ENGINEERING NEWS-RECORD

SEPTEMBER 10, 1942

Lining Pipe in Place
Structures on Landfills
Forms That Speed Winter Work
More Production from Truck Mixers



meter testing on a mass production a new development of the Los es Water Department. (see article).

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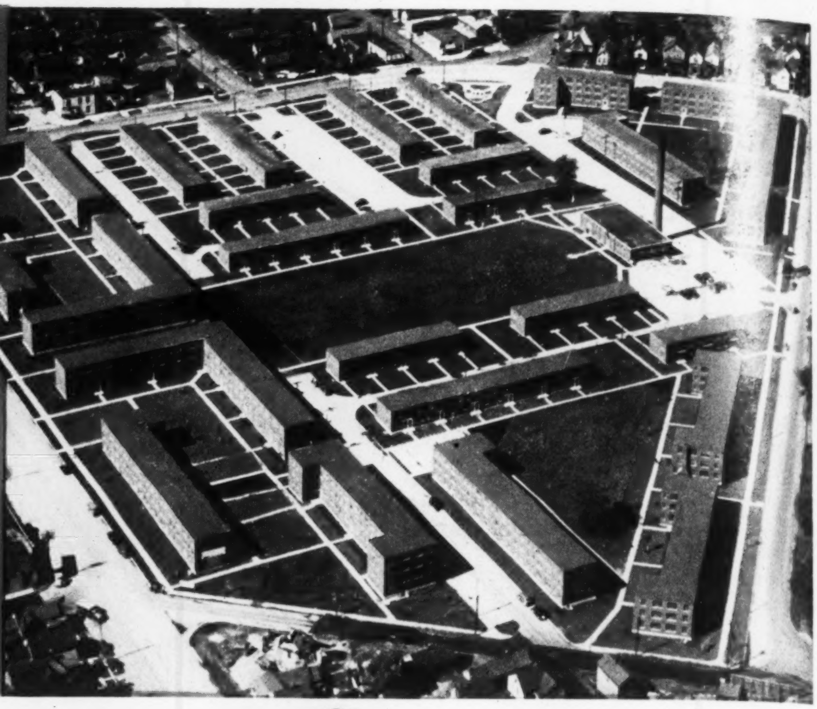
The "EXPERIENCE POOL" fore-armed this project against corrosion



BYERS WROUGHT IRON

LOOK FOR THE PIPE WITH THE RED SPIRAL STRIPE...

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Engineers
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Conversion for war isn't confined to mills and plants alone. Many engineers have also had to convert their talents and equipment for service in new fields to meet the needs for rapid, large-scale construction of housing developments, plants, and other structures essential to emergency effort. Problems are frequently encountered for which past practice provides no answer. This is especially true where piping specification is involved.

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The projected water supply (wells) and water treatment were similar to those in a large local institution. Samples of the softened water; of the boiler water; of the condensate; and of the boiler compound used, were sent to the Byers Laboratories, where the analysis and corrosive characteristics of each sample were determined. The "Experience Pool" then provided case histories of various piping materials under identical conditions, which permitted sound engineering recommendations, based on *facts* instead of hopes or guess-work. Byers Wrought Iron was installed for all concealed water lines, and for all underground gas piping.

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WALDO G. BOWMAN, *Editor* **ALBERT E. PAXTON, *Manager***

Vol. 129 SEPTEMBER 10, 1942 No. 11

COMING NEXT

- "The Seabees Are Coming!" An authentic account, told for the first time, of the Navy's new construction battalions, some 40,000 strong, who are building bases on the far-flung battlefronts of this global war. This unique branch of our armed services is forging another link in the long chain of outstanding achievements of American civil engineers and construction men. It is a story you will not want to miss.

- Tentapolis, Ill., makes news in the field of water softening with the installation of a lime treatment process that produces no wet, pasty sludge. First municipal plant of its type in this county, it will be described by Alex Van Pragg, Jr., of Warren & Pragg, the consultants on the work.

- One of the most interesting examples of mass production methods being employed to speed our war effort is the recent fabrication of 1,036 timber trusses of 50-ft. span at an average rate of 28 per eight-hour day. Fabricated wood columns were produced at double the truss rates. And, this is not all the story—See *ENR*, Sept. 24 issue.

LOOKING AHEAD

- The ingenuity being exhibited by our contemporary engineers in solving difficult problems under wartime pressure is becoming almost uncanny. Every day some unique method comes to light for doing a better job, at the same time speeding up the work. Now comes the use of precast concrete jackets to level up reinforced-concrete piles driven to uneven depths into a cemented sand bottom. The jackets on top of the piles compensated for the difference in lengths, and their larger top area gave a wider bearing on which to support deck beams. Other advantages will be pointed out in an article to appear in an early issue.

- How the use of automatic welding machines is influencing the technique of cargo ship construction, and doing a welding job about five times as fast as could be accomplished by manually operated equipment will be told in a future issue.

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MONTHLY CONSTRUCTION BUSINESS SUMMARY

ENR CONSTRUCTION VOLUME AND NEW CAPITAL . . . . FHA MORTGAGES

* (000 omitted)	August 1941	August 1942	% Change	Eight Months 1941	Eight Months 1942	% Change
Total Construction	$529,561	$813,077	+53.5	$4,329,627	$6,919,897	+60.0
Private Construction	72,982	33,069	−55.0	893,742	436,517	−51.0
Public Construction	456,579	780,008	+71.0	3,435,885	6,483,380	+89.0
Federal	376,426	748,390	+99.0	2,547,920	6,071,897	+138.0
Total New Productive Capital	$396,186	$18,494	−95.0	$5,403,461	$9,518,744	+76.0
Private Investment	41,857	18,494	−56.0	627,462	340,727	−46.0
Federal (non-federal work)	24,129	....	....	378,410	211,119	−44.0
Federal (federal work)	330,200	....	....	4,397,589	8,966,898	+104.0
FHA Mortgages Selected for Appraisal (Title II)	$120,234	$26,476	−78.0	$1,011,891	$429,708	−58.0
(Title VI)	16,730	60,677	+263.0	110,490	522,502	+373.0

CONSTRUCTION COSTS . . . . WAGE RATES . . . . PRICES

	September 1941	September 1942	% Change	Changes August to September 1941 Aug.	1941 Sept.	%	1942 Aug.	1942 Sept.	%
E N R Construction Cost Index, 1913 = 100‡	263.12	281.61	+7.0	260.41	263.12	+1.0	281.61	281.61	0
E N R Building Cost Index, 1913 = 100‡	214.58	225.46	+5.1	212.45	214.58	+1.0	225.39	225.46	†

‡ *Does not reflect increased costs due to more overtime, lower labor efficiency, delivery delays, etc.*

ENR 20-CITIES' AVERAGE

	September 1941	September 1942	% Change	1941 Aug.	1941 Sept.	%	1942 Aug.	1942 Sept.	%
Common Labor	$0.761	$0.823	+8.1	$0.753	$0.761	+1.1	$0.823	$0.823	0
Skilled Labor (Av. 3 trades)	1.516	1.586	+4.6	1.501	1.516	+1.0	1.585	1.586	+0.1
Bricklayers	1.608	1.687	+4.9	1.595	1.608	+0.8	1.687	1.687	0
Structural Ironworkers	1.582	1.637	+3.5	1.582	1.582	0	1.632	1.637	+0.3
Carpenters	1.358	1.435	+5.7	1.327	1.358	+2.3	1.435	1.435	0
Cement, per bbl	$2.52	$2.61	+3.6	$2.52	$2.52	0	$2.60	$2.61	+0.4
Reinforcing steel, per cwt.	2.59	2.69	+3.9	2.59	2.59	0	2.69	2.69	0
Struct. steel shapes, base	2.10	2.10	0	2.10	2.10	0	2.10	2.10	0
Sand, per ton	1.18	1.21	+2.5	1.18	1.18	0	1.21	1.21	0
Lumber, 2x4 Fir, per M ft.	44.72	51.10	+14.3	43.05	44.72	+3.9	51.10	51.10	0
Lumber, 2x4 Pine, per M ft.	40.01	44.27	+10.7	39.63	40.01	+1.0	44.27	44.27	0
Brick, common, per M	14.83	15.63	+5.4	14.76	14.83	+0.5	15.56	15.63	+0.4
Ready-mixed concrete, c.y.	7.07	7.34	+3.8	7.07	7.07	0	7.34	7.34	0
Struct. clay tile, 3x12x12	75.99	77.97	+2.6	75.01	75.99	+1.3	77.97	77.97	0
Paving asphalt, cars, ton	14.63	14.92	+2.0	14.60	14.63	+0.2	14.92	14.92	0

† *Less than .05 percent change.*

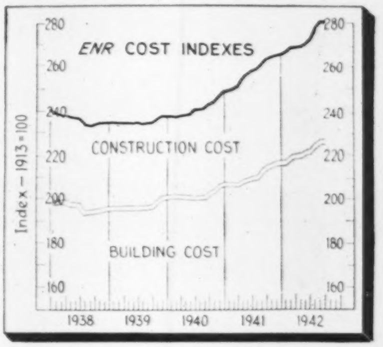
MATERIAL SHIPMENTS . . . . BUILDING PERMITS

	August 1941	August 1942	% Change	July 1942	% Change July-Aug.
Lumber (% 1935-'39 weekly seas. av.) N. L. M. A.	156.0	142.8	−8.5	155.4	−8.1
Steel (% operating capacity) A. I. S. I.	96.2	97.2	+1.0	97.8	−0.6

	July 1941	July 1942	% Change	Seven Months 1941	Seven Months 1942	% Change
Fabricated Structural Steel, tons, A.I.S.C.	203,026	181,193	−10.7	1,281,296	1,258,873	−1.7
Cement, thous. bbl., U.S.B. of M.	16,687	20,501	+22.9	88,331	99,845	+13.0
Building Permits, Dun & Bradstreet (,000 omitted)	$155,875	$60,517	−61.2	$913,456	$569,958	−37.6

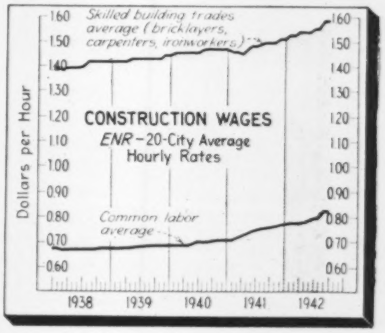
COST OF LIVING INDEXES . . . . EMPLOYMENT

	July 1941	July 1942	% Change	June 1942	% Change June-July
Cost of Living Index, N.I.C.B.	88.9	97.5	+9.7	97.3	+0.2
Rent (Housing) Index, N.I.C.B.	88.4	90.8	+2.7	91.0	−0.2
Total Employment (est.) thous., B.L.S.	34,939	37,100	+6.3	35,665	+1.2
Construction Employment (est.) thous., B.L.S.	2,100	2,061	−1.8	1,991	+3.5



ENR INDEX NUMBERS

Base = 100	Construction Cost 1913	Construction Cost 1926	Building Cost 1913	Building Cost 1926	Volume '13	Volume '26
Sept., 1942	281.61	135.37	225.46	121.88	...	...
Aug., 1942	281.61	135.37	225.39	121.84	622	273
July, 1942	277.65	133.46	223.45	120.79	736	323
June, 1942	274.19	131.80	221.18	119.56	752	330
May, 1942	272.30	130.89	220.14	119.00	821	360
April, 1942	271.78	130.64	219.55	118.68	569	249
Mar., 1942	269.71	129.65	218.88	118.32	578	253
Feb., 1942	269.41	129.51	218.44	118.08	507	222
Jan., 1942	267.63	128.65	217.12	117.37	402	176
Dec., 1941	266.16	127.94	216.37	116.96	217	95
Nov., 1941	266.13	127.93	216.54	117.05	282	124
Oct., 1941	264.46	127.13	215.92	116.72	263	115
Sept., 1941	263.12	126.48	214.58	116.00	419	184
Aug., 1941	260.41	125.18	212.45	114.84	434	190
1941 (Av.)	257.84	123.95	211.46	114.32	375	164
1940 (Av.)	241.96	116.31	202.81	109.64	269	118
1939 (Av.)	235.51	113.21	197.44	106.73	211	92
1938 (Av.)	235.86	113.34	196.83	106.40	197	86



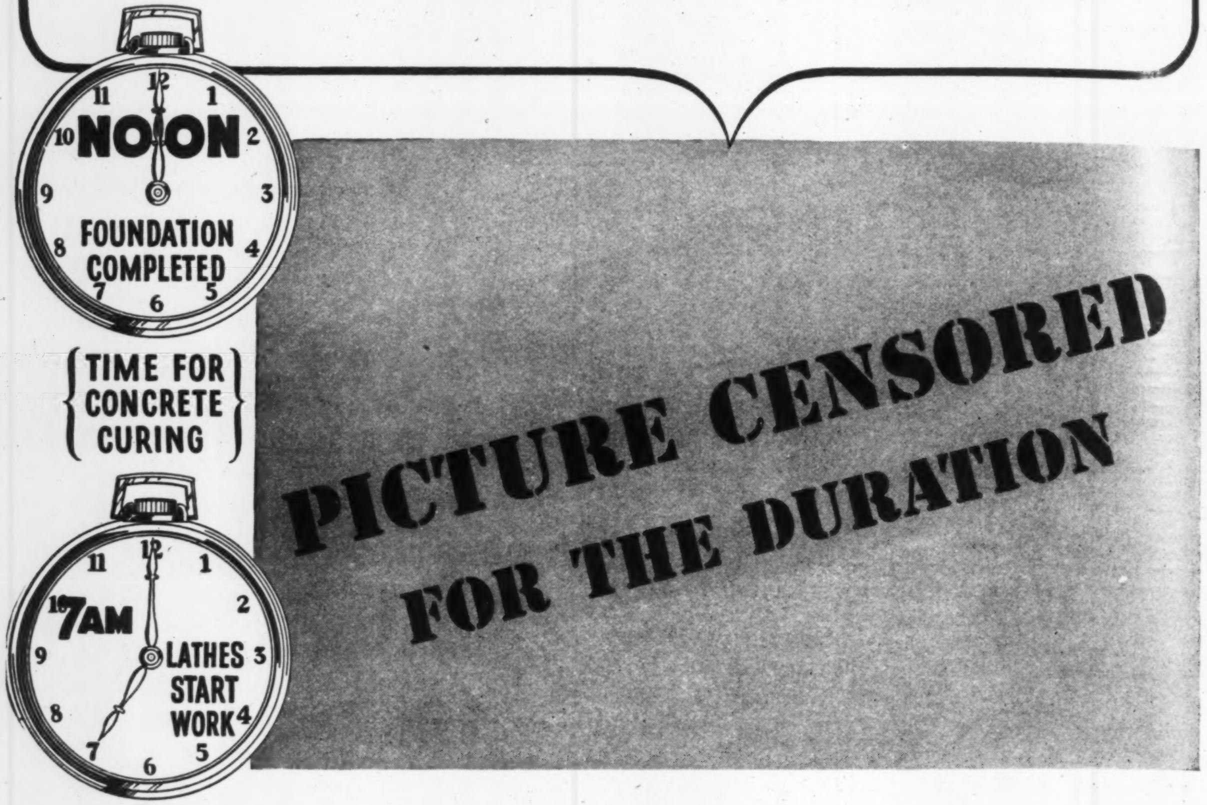
ENGINEERING CONSTRUCTION CONTRACTS——ENGINEERING NEWS-RECORD——AUGUST, 1942

Engineering News-Record *reports projects of the following minimum costs—waterworks, excavation, drainage and irrigation,* $15,000; *other public works,* $25,000; *industrial buildings,* $40,000; *other buildings,* $150,000

Four Weeks—Thousands of Dollars (000 Omitted)

	New England	Middle Atlantic	South	Mid West	West of Mississippi	Far West	United States August 1942	United States Eight Months 1942	United States Eight Months 1941	Canada
Public Works										
Waterworks	1,136	715	6,644	2,239	7,595	3,734	**22,063**	96,744	55,299	343
Sewerage	70	753	6,867	5,779	2,348	3,579	**19,396**	84,123	64,255	284
Bridges, public	33	279	334	1,248	554	648	**3,096**	40,940	79,090	80
Earthwork and waterways	80	726	2,133	2,051	10,468	2,229	**17,687**	226,490	203,961	22
Streets and roads	1,054	4,884	19,850	16,167	13,118	11,280	**66,353**	362,963	427,634	7,506
Buildings public	14,107	73,419	94,868	35,244	162,664	59,871	**440,173**	4,340,628	1,994,332	4,885
Unclassified, public	33,247	4,877	45,273	21,044	69,317	37,482	**211,240**	1,331,492	611,314	11,389
Total public	**49,727**	**85,653**	**175,969**	**83,772**	**266,064**	**118,823**	**780,008**	**6,483,380**	**3,435,885**	**24,509**
Federal government (included in above classifications)	48,517	80,853	171,209	74,578	260,000	113,233	**748,390**	6,071,897	2,547,920	....
Private										
Bridges, private	....	25	....	....	7	....	**32**	890	5,360	....
Industrial buildings	1,222	961	168	2,526	1,163	430	**6,470**	172,012	355,774	4,482
Commercial buildings	1,845	4,517	848	1,992	3,645	10,921	**23,768**	226,233	373,592	....
Unclassified	370	....	25	....	724	1,680	**2,799**	37,382	159,016	....
Total private	**3,437**	**5,503**	**1,041**	**4,518**	**5,539**	**13,031**	**33,069**	**436,517**	**893,742**	**4,482**
Total Engineering Construction:										
August, 1942 — 4 weeks	**53,164**	**91,156**	**177,010**	**88,290**	**271,603**	**131,854**	**813,077**	....	....	**28,991**
July, 1942 — 5 weeks	27,705	112,029	196,827	169,732	499,846	195,387	**1,201,526**	....	....	27,407
August, 1941 — 4 weeks	45,402	77,395	116,137	64,211	177,674	48,742	**529,561**	....	....	20,058
Eight Months — 1942	**286,817**	**891,181**	**1,405,079**	**1,215,409**	**1,912,495**	**1,208,916**	....	**6,919,897**	....	**151,275**
Eight Months — 1941	231,625	886,852	989,990	676,201	980,490	564,469	....	....	4,329,627	185,326

Ready for 4½-ton bomb-casing lathes AFTER ONLY 19 HOURS!



Consider Atlas High-Early Cement for every **"RUSH"** *job!*

A STEEL PLANT (name and location deleted by censor) was being converted to manufacture 300- to 400-lb. bomb casings. Foundations for 4½-ton lathes had to be built quickly. The contractor reported that Atlas High-Early cement was used with the following result:

▶ **At 12:00 noon placement of the Atlas High-Early concrete foundation was completed.**

▶ **At 7:00 A. M. the following day—just 19 hours later—the 4½-ton lathes were in place on the foundations and were at work on bomb casings.**

The contractor advises that a stiff mix (1½″ slump) of Atlas High-Early concrete was used. The aggregate was heated, and the concrete was carefully protected and cured.

Speed is the rule with Atlas High-Early cement—speed in building cantonments, defense housing, roads, airports—speed in building, converting, and repairing industrial plants—that's today's "must." And speed with economy is the reason why Atlas High-Early cement is being specified today. Specify it on your next job. Universal Atlas Cement Company (United States Steel Corporation Subsidiary), Chrysler Bldg., N.Y.C.

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ENR-H-45

ATLAS HIGH-EARLY CEMENT

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The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • SEPTEMBER 10, 1942 • VOLUME 129 • NUMBER 11

Construction workers' status in draft to be outlined

Selective Service memorandum expected to advise local draft boards on standards for deferments of construction men. Changes in deferment procedure seem likely

The selective Service System is expected, within a few weeks, to send a memorandum to local draft boards giving them advice on the construction industry's importance to the war effort, and as to which occupations in the industry are of a critical nature.

This document, when issued, will not be in any sense a blanket deferment from the draft for construction men. In theory it does not in any way change their liability to military service.

The memorandum will become a guide to the local draft boards in deciding whether a particular construction man is entitled to occupational deferment. It should therefore greatly ease the problem of construction employers in getting deferments for their men.

Selective Service has so far issued memoranda of this nature in connection with a dozen or more specific industries. They represent an attempt to standardize somewhat the widely varying interpretations of the draft law made by the practically autonomous local boards.

As regards construction, something of the same objective is already achieved by inclusion of the industry on a blanket list of essential activities issued last July (*ENR*, July 23, p. 129). That list recognized the essentiality of "Highway and street construction, marine construction; and construction of approved industrial plants, houses, hospitals, and military projects and repair of such facilities; as well as all basically metallic materials, parts, equipment; and services necessary to complete such construction."

Many engineers and construction men, too, are covered by the inclusion in the same document of "Governmental services: Including services necessary for the maintenance of health, safety, and morale, and the prosecution of the war."

The forthcoming construction memorandum will probably follow the July document in its description of the essential types of construction, though it may define them more clearly. It will also include a listing of those occupations in the industry that involve skill and a substantial amount of training and in which there is a scarcity.

It is probable that fundamental changes will be made, within the next few months, in the whole system of occupational deferments, but the memorandum, when it is issued, will make it easier for the industry to operate under the present system.

Now two types of deferment

Two main types of deferment are now recognized. Occupational deferments to certain men engaged in activities that either directly contribute to the war effort—such as munitions manufacture or construction of an airbase—or which contribute indirectly by keeping the basic economy in shape for the waging of a war—as by operation of the railroads or construction of highways. Men in the first type of activity are granted 2-A deferments, men in the second, 2-B.

It is not sufficient for deferment, however, that a man merely be engaged in one of these essential activities. He must also hold a critical occupation in this industry. A critical occupation is one requiring the exercise of skill and one in which there is a scarcity of men to replace the man in question should he be drafted.

Either a 2-A or 2-B deferment is supposed to be granted only for a period of time necessary to train a replacement. Such a replacement should be a woman, a man over 45, or a man with a large family; otherwise the replacement is likely to be drafted in turn.

In practice, of course, deferments are frequently renewed in cases where men cannot be trained fast enough or soon enough to meet the need. In recent

Press Assn. Photo

Bethesda naval hospital dedicated

President Franklin D. Roosevelt on Sept. 1 dedicated the new $4,850,000 naval hospital at Bethesda, Md., near the national capital.

The 270-ft. main tower, to be surmounted by an airplane beacon, is surrounded by three- and four-story wings.

Precast exposed-aggregate slabs are being used for trim throughout the main building and for structural outside finish. Construction of the building was begun in 1940 (ENR, July 10, 1941, p. 55). The building was designed by the Bureau of Yards and Docks, with Paul Cret as consulting architect.

John McShain, Inc., Philadelphia, held the general contract and the American Bridge Co., Pittsburgh, erected the steel.

months, however, the Army has been taking men at an unprecedentedly high speed, and pressure is being put even on the rapidly expanding war industries to substitute people not liable to military service for their men with occupational deferments.

Decision as to whether a particular man should receive an occupational deferment is made by his local draft board, guided by the various advisory memos sent by national and state headquarters. Application for such a deferment is made by the employer, with or without the consent of the man in question.

When an employer learns that an employee he considers essential is about to be classified 1-A, he should obtain from the draft board a Form 42A, requesting deferment. He will be notified of the board's action before the man is drafted. If the decision is adverse, he will have ten days to file an appeal on Form 59, which will be sent to him by the draft board when notifying him of the adverse decision. Submission of this form automatically carries the matter to the local appeals board. Thereafter the case may be appealed to the State Director of Selective Service and subsequently to the President.

Deferments are also granted to men with dependents. Since last July a wife or children have been recognized as dependents whether or not they are actually financially dependent. Dependency deferments are divided into two types. If a man is working in an essential industry he is classified 3-B, otherwise 3-A. To qualify for a 3-B, it is not necessary that the man hold a critical occupation in the essential industry, merely that he be working in it.

Pending changes likely in the draft system include: elimination of voluntary enlistment; calling of men by occupation (i.e. a draft board would be told to call up so many carpenters), and a scheme now being studied by which a pattern of occupational deferments would be worked out for each employer instead of treating his men singly.

• • •

Sevison retires as North Dakota highway chief

Z. E. Sevison has resigned as state highway engineer for North Dakota, after a five year term during which he reorganized the department.

During his term of office, he was responsible for the rebuilding of much of the state's road system, including hard surfacing of all main routes.

Mr. Sevison returned to his former home at Casper, Wyo., to resume a consulting engineering practice there. Before going to North Dakota, he was head of the Wyoming Highway Department for 16 years.

Construction for U. S. armed forces poses biggest British building problem

Construction crews taken as teams from private and public work to help out; hutment construction standardized

Construction of port facilities, aerodromes, runways, camps and other accommodations needed for the armies and air forces being poured into the British Isles from the United States, provides British builders with their biggest war job, according to Ernest Bevin, British Minister of Labor.

In order to complete the work in time, many sweeping changes in building organization have been made, Mr. Bevin said recently, in outlining plans to meet the problem.

Employers who cannot themselves be used must lend their foremen and supervisory staff to others, and some of these employers themselves may be wanted as supervisors. Where employers arrange for a number of men to be transferred, the Ministry of Labor transfers the men as a team, and when the job is done, the men will be returned together to take up the work they left.

Much public and municipal work has been stopped to the end that men can be released for the urgent job of building camps for overseas troops. Since even public building in Britain is now limited to only the most important work, these interruptions will not be felt seriously, the Minister added.

Standardized huts

As an aid to speeding up camp building, the Ministry of Works and Planning has concentrated on one standard hut 60 ft. long and 18½ ft. wide, with a floor area of 1,104 sq. ft. The framework of reinforced concrete only is standardized, while various types of covering and panelling can be used with it to suit local conditions.

The precast concrete framework is erected on a standard foundation that can be laid before the materials arrive. Its characteristic features are the bracketed posts which permit the reinforced concrete transverse ribs that form the roof support to be bolted to the upper arm of a gallows-like structure. Ribs run upward at an angle of about 25 degrees and meet at the apex, where they are secured by a continuous metal bar running through the ribs the whole length of the hut. Timber purlins are wired to the concrete ribs, but the roof itself consists usually of corrugated asbestos cement sheets. Other roofing materials, such as felt-covered plasterboard panels, may also be used.

Walls are built of brick, clay block, plasterboard, wood-cement, wood-wool slabs cement-rendered, or asbestos-cement sheets combined with wood-wool.

Erection of the framework takes about 100 man-hours, and the hut can be completed in approximately 200 man-hours, not including the foundation.

In its present form the hut is said to avoid some of the defects of earlier designs, which included excessive weight of individual standard parts, difficulty of fixing, formation of cracks, and the need of skilled labor.

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Fort Greene housing project dedicated

Fort Greene Houses, a state-aided defense housing development for Brooklyn Navy Yard workers (*ENR*, Aug. 27, p. 302) was dedicated Sept. 9 at ceremonies attended by Governor Herbert H. Lehman, Mayor F. H. La Guardia, Rear Admiral E. J. Marquart, and others.

The project, estimated to cost $20,363,000, was built with the aid of loans from the State Division of Housing, and is to be operated by the New York City Housing Authority with the aid of subsidies from the state and New York City. It is the thirteenth housing project constructed by the City Housing Authority, and the second defense housing project.

When all buildings are completed, Fort Greene Houses will contain 3,501 apartments for about 13,100 persons, in six to thirteen story structures covering about 21 percent of the land available. Originally planned as a low rent housing development, except for former site tenants, all apartments in Fort Greene Houses will be assigned to Navy Yard workers certified by the Commandant.

It is expected that 1,428 dwelling units will have been completed by Dec. 1, barring unexpected delays.

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Wolman in South America on public health study

Abel Wolman, Baltimore consulting engineer and president of the American Water Works Association, is a member of a seven-man delegation that left for Brazil August 31 to discuss public health problems in relation to the war and postwar developments.

The group, which will meet with similar delegations from Central and South American countries, is traveling under the aegis of the U. S. Department of State, and will be gone for about a month.

BRIEF NEWS

Repairs to the 32-year-old state capitol building at Frankfort, Ky., have been virtually completed, other than interior repainting and cleaning of the building. The work cost about $189,000 and included replacing the dome and placing a new roof, repairing most of the terrace around the structure. Repairs have taken about two years.

The staff of the city engineer of Dallas, Tex., is engaged in comparison of costs of construction of a new section of U. S. Highway No. 75, in 125 ft. and 150 ft. widths, as compared with the proposed 200 ft. width. The state has offered to pay $2,100,000 of the estimated $6,000,000 cost of the improvement, and city officials hope to gain either an increased state allotment or a revision of plans to reduce the cost to the city.

Marte R. Gomez, Mexican Minister of Agriculture and chairman of the Mexican irrigation commission, has announced that the $2,400,000 Las Virgenese dam in Chihuahua state, is nearing completion. Part of an irrigation improvement program, the dam will impound about 345,000 acre-ft. of water for irrigation of 135,000 acres of land. The dam is to be ready for service by next summer.

Students in a new course to be given by the school of architecture of Columbia University will be instructed in the highly professional skills and problems of concealing vital industrial plants, public buildings and strategically important rural and urban areas. The course is designed essentially for engineers, architects, industrial designers and persons similarly qualified. Courses will be two nights a week for 8 weeks, with special additional laboratory work arranged. The course will start the latter part of December.

Construction of a $200,000 athletic field house at the University of Kentucky, at Lexington, and considerable new construction and repair work at various state institutions will now go ahead in view of a decision by the Kentucky Court of Appeals upholding legislative appropriations of $11,270,000 to be spent on state requirements. Use of the money appropriated had been blocked by action of the Attorney General who had claimed that the program was illegal.

The Missouri Public Service Commission has postponed until Oct. 15 a public hearing on the application of the Union Electric Co. of Missouri for permission to purchase, maintain and operate the Laclede Power & Light Co.'s properties in St. Louis and vicinity. St. Louis city officials, who have declared opposition to the plan, asked the postponement.

After a delay of several months owing to inability to find a site, the city council of Halifax, N. S., has finally approved a location for a colony of 200 prefabricated houses. The colony would be the start of a plan to erect 400 such dwellings to relieve acute housing congestion in and near Halifax.

Indefinite postponement of a proposed $1,300,000 federal housing project at Elyria, Ohio, has been announced by W. T. Francis, secretary of the Lorain Metropolitan Housing Authority.

Baltimore has 500 public air-raid shelters ready

With almost 500 public air-raid shelters ready for occupancy, Baltimore, Md., believes that it is far ahead of any other city in providing such facilities for civilian defense, according to J. A. Clarke, city buildings engineer.

Located in basements of public and private buildings—more than 4,000 of which were surveyed before selections were made—the shelters provide some 950,000 sq. ft. of space. The average shelter has a floor area of 1,900 sq. ft. Based on the need per person of 10 sq. ft., for lying down, and 4 sq. ft. for standing, the total area would accommodate 95,000 people overnight or 237,000 for a short period.

To fit the basements for shelter use, outside windows are sandbagged, and minor alterations have been made on the interiors for quick entrance and exit.

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Kentucky consolidates highway offices

Consolidation of four state highway department offices into one has been announced by Kentucky State Highway Engineer Thomas H. Cutler.

The new consolidated office, headed by Oscar Smith, locating engineer and zone chief, will be located at the new highway materials research laboratory on the University of Kentucky campus at Lexington, Ky. The four zone offices, formerly located at Covington, Williamsburg, Versailles and Mount Sterling, will carry on their many activities from the central office.

Cutler said the move was made because members of the department personnel have been called to military service and the individual offices were unable to carry on with their existing staffs.

Quebec to eliminate last toll bridges

The government of the province of Quebec, Canada, has announced that negotiations are now under way to eliminate toll charges on the last five remaining tool bridges in and to the province.

The bridges in question are the Victoria and Jacques Cartier bridges crossing from Montreal to the south side of the St. Lawrence River; the Terrebonne bridge on the Mille Isles River; Grand Mere bridge on the St. Maurice River and Noyan bridge on the Richelieu River between Noyan and Lacolle. The last three named bridges are operated by municipalities.

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Capital suburb hospital plans speeded

Officials of Maryland and Virginia towns in the Washington, D. C., metropolitan area rushed plans last week to implement a $3,000,000 hospital expansion program which has been made possible by an announced FWA fund allotment.

The expansion program will include a $700,000 building to enlarge the Alexandria, Va., hospital, a new institution to be built in Montgomery County, Md., by the Suburban Hospital Association, Inc.; construction of a 100-bed hospital and a 50-bed nurses' home in Prince Georges county, Maryland; a 100-bed hospital and a 50-bed nurses' home to be built by the Arlington Hospital Association in Arlington, Va., and other work.

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Capital's 1944 street budget cut in half

Reduced revenues from gasoline taxes, ascribed to rationing, have compelled the highway department of the District of Columbia to reduce its 1944 budget requests by 52½ percent from the 1943 appropriation.

A total appropriation of $2,254,040 is sought by the department for the fiscal year ending June 30, 1944, as compared with a 1943 twelve-month appropriation of $4,757,130.

Despite the lower budget request, the department reported as pending a large number of projects involving street construction and repair.

Pointing out that the city now has some 910 miles of roadway and 1,348 miles of sidewalk to be properly maintained, the department added that new housing developments in and around the city have opened miles of new streets which also must be placed in some form of repair for adequate service.

Commercial and industrial power use restricted by shortage in Canada

Survey shows Ontario and Quebec likely to be most seriously affected by lack of power for all industry. Paper output cut

A recent survey of the power supply situation in Canada shows that a power shortage is general in the dominion, and that Ontario and Quebec—where more than 80 percent of Canada's power resources are located—are likely to be the most seriously affected.

In December, 1938, the Ontario Hydro-Electric Commission had a total dependable power reserve of 1,610,000 hp. By December, 1941, the commission had no power reserve, and in December of 1942 a shortage of about 250,000 hp. is being forecast.

First step in a program to insure equitable power distribution probably will take the form of restrictions on "luxury" power (*ENR*—Aug. 27, p. 271). Some time late this month it is expected that showcase and ornamental lighting, air heaters in stores and offices, and street lighting will be curtailed. It is felt unlikely that the restrictions will extend beyond Ontario and Quebec, where most of the country's industries are located. Reports have indicated that first restrictions will be in southern Ontario, where curtailment of pulp and paper industries is expected.

Among suggestions made and rejected for the alleviation of the situation is one for the transfer of heavy industry to other parts of the dominion. However, it is felt that sufficient power reserves do not exist in other provinces to warrant any major change in the industrial set-up. A few new power plants, notably the Barrett Chute plant on the Madawaska River, about 75 miles west of Ottawa, and others, are expected to be in service this fall, but do not generate enough power to make up the deficiency.

Paper output cut

Canada's newsprint industry, under the leadership of R. L. Weldon, of Montreal, newly appointed newsprint administrator, has been brought under an allocation system to meet in an orderly and equitable manner the dislocations to which the industry is subjected by shortages of power and labor, according to the Wartime Prices and Trade Board.

Explaining the reasons for its order, the board said that the demand for newsprint has already fallen off so that the industry as a whole in Canada is operating between 60 and 70 percent of capacity. "The special needs of war industries for electric power will require diversion of power by order of the Power controller from certain newsprint mills, and in some areas pulpwood production has been restricted by the timber controller in order to release labor and equipment for lumber operations."

Ottawa River plans

Negotiations between the provinces of Quebec and Ontario for further large power developments along the interprovincial section of the Ottawa River are reported to be nearing successful conclusion. Instead of following the scheme adopted when the plant at Chats Falls was built, namely, division of the flow between power units owned and operated by each province, the present plan calls for an exchange of power sites. Quebec will develop the sites below the city of Ottawa, which are nearer to the load centers in Quebec, and Ontario will develop the remaining sites above Ottawa along the interprovincial border. This would transfer full development rights at the Carillion and Rocher Fendu sites to Quebec and rights to the Cave, Fourneaux and Des Joachim sites to Ontario. The Quebec legislature approved the plan in principle at its last session; the Ontario legislature has not acted on it, but provincial legal advisers hold that the agreement can be approved by an order-in-council.

Due to power shortages, work on at least one of the sites assigned to Ontario is expected to start soon.

Press Assns. Photo

Hartford Bridge, with longest girder spans, opened

Charter Oak Bridge, a new crossing of the Connecticut River at Hartford, Conn., was opened to traffic on Sept. 5. With its approaches, it forms a new link in the Wilbur Cross Parkway, which with the Merritt Parkway is to form a new main highway running diagonally across Connecticut from the New York metropolitan district to the Massachusetts line near Worcester. On the Hartford side of the river a wye approach permits the new bridge to serve as a by-pass around the business district. This by-pass is expected to reduce by 25 percent the load of 80,000 vehicles per day on the old stone-arch bridge immediately upstream, which discharges directly into the business district of the city. During rush hours the bridge is expected to cut travel to East Hartford's war industries by as much as forty minutes.

The new bridge is 3,950 ft. long, a deck-plate-girder structure with two 24-ft. roadways separated by a central mall. The main river crossing consists of an 840-ft. girder continuous over three spans of 270-300-270 ft., the 300-ft. center span being the longest in the United States.

An erection accident last December (ENR, Dec. 11 p. 837) involving one of the 270 ft. spans of the main crossing resulted in the death of 16 bridge workmen including W. J. Ward, veteran erection superintendent for the American Bridge Co.

The bridge will be operated by the Connecticut Department of Highways as a toll structure with a basic toll rate of five cents per axle. Robinson & Steinman are consultants on the work for the highway department, of which L. G. Sumner is engineer of bridges and structures.

The substructure of the bridge was built by A. I. Savin Construction Co. of Hartford under a $672,500 contract. The superstructure was fabricated and erected by the American Bridge Co. for a bid price of $1,237,000.

Total cost of the project, including land acquisition and approach roads is $4,215,000.

General Grant named head of capital plan body

Brig. Gen. U. S. Grant III, formerly commander of the Engineer Replacement Training Center at Fort Leonard Wood, Mo., and more recently War Department representative on the Office of Civilian Defense Board for Civilian Protection, has been appointed chairman of the National Capital Park and Planning Commission.

General Grant succeeds Frederic A. Delano, uncle of the President, who asked to be relieved of his duties as chairman of the commission. Mr. Delano had been chairman of the planning commission since 1929.

General Grant, a West Point graduate in 1903, has been a member of the Corps of Engineers since his graduation and has served as director of public buildings and grounds of the national capital from 1926 to 1933.

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TVA and auxiliaries pay $3,709,416 in lieu of tax

The Tennessee Valley Authority, during the year ending June 30, 1942, paid to six states and 113 counties a total of $1,859,416 in lieu of taxes as required by the amendment to the TVA act of 1940. For the same period taxes and tax equivalents provided by municipalities and cooperatives distributing TVA power were about $1,850,000.

The combined payments, totaling $3,709,416, exceeded by about $988,000 the property taxes formerly paid on power production and distribution properties under private ownership.

The former state, county, district and municipal property taxes on power property and on reservoir land held by the Authority on June 30, 1941, averaged $1,206,209 for the last two years that this property was in private ownership. Of this figure, $937,947 was for taxes on power property, and $268,262 represented the taxes on reservoir lands. Former annual taxes on power property purchased by the municipal and cooperative distribution systems securing power from the Authority for resale were $1,515,082. The total of all former property taxes on property acquired by the Authority and on the electric distribution plant, including 100 percent of the former taxes on reservoir lands, is $2,721,291.

Under provisions of the Norris-Sparkman amendment to the TVA act, payments in lieu of taxes are now being made in monthly installments to states and counties directly affected by the authority's power operations.

Largest payment listed by the agency is $2,900,884, representing the total payment to the state of Tennessee. Other payments included $512,426 to the state of Alabama, $147,239 to Mississippi, $66,809 to Georgia, $44,268 to Kentucky, and $37,790 to North Carolina.

Camouflage Note

Dried digested sludge, a by-product from sewage treatment, has been ingeniously adapted to camouflage purposes as a ground cover material.

This material is almost black in color, has the physical appearance of humus, and has no objectionable odor. It was spread to a depth of several inches over the entire site of a recently constructed manufacturing plant, where protective concealment measures were undertaken.

Some 30,000 tons of the dark-colored sludge obliterated the reflection from the light-colored soil that was exposed during construction operations. Further, because of its fertilizing value, the sludge is expected to serve as a good base for quick growth of grass.

War cuts into personnel of highway departments

The armed services, war industries and more lucrative private employment are draining the technical staff of state and municipal highway departments throughout the country, it appeared last week.

At Lansing, Mich., for example, G. Donald Kennedy, state highway commissioner, announced that about 250 highway department employees now are serving in the armed services. From Jan. 1 to July 15, 41 percent of the department's draftsmen left its employ; 25 percent of the designers have left, and 27 percent of the inspection and engineering staff also was lost.

"At the present time, 74 percent of the highway department engineering personnel is engaged in building roads for war production factories in the metropolitan Detroit area," Mr. Kennedy added.

I. Lamont Hughes, secretary of the Pennsylvania Department of Highways, said that his department is now operating with 659 fewer employees than were on the payroll at the start of the year. On Jan. 1 the department had 2,728 employees, compared with 2,069 at the present time. Hughes said the engineering staff has suffered most from the war's call for trained men.

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Engineers to buy lumber for all war agencies

The construction division of the Corps of Engineers in the future will do the buying of all the lumber required by the Army, Navy, and Maritime Commission under an arrangement worked out by the Army and Navy Munitions Board. Under this system, the Engineers will be buying about half the lumber produced in the country—with purchases averaging a billion and a quarter board feet a month.

Army lumber buying for the cantonment program was centralized more than a year and a half ago under the old construction division of the Quartermaster Corps. The centralized purchasing function went over to the Engineers when the QM construction division was transferred to that corps. Since that time, the Engineers have frequently bought lumber for other branches of the Army and for the Navy.

The auction and direct negotiation systems of purchasing will be used. Allocation of the lumber purchased among the agencies will be up to a Lumber Advisory Board of representatives of the three agencies or, in case of dispute, to the Army and Navy Munitions Board Lumber Committee.

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Army considering re-use of camp laundry water

Efforts directed toward the conservation of water supply at camps has led the Army into an investigation of laundry water reclamation. Processing this waste water for reuse will save about 10 gal. per day per man; reclaimed water will be used for washing laundry or equipment.

The treatment process involves segregation of the laundry waste from other waste water, addition of a lime precipitant, flocculation with air, and sedimentation. Equipment developed by the Pacific Flush Tank Co. and the Chicago Pump Co. is being used by the Army engineers in their studies.

Pan American highway construction award made to civilian contractors

U. S. Engineer troops will do bulk of work on pioneer highway from Mexican border to Panama. Contract total not listed.

U. S. contractors are taking a hand in completion of the pioneer road from the southern border of Mexico to the Panama canal (*ENR* July 30, p. 143). This was revealed last week when the War Department made its only announcement to date of the award of a contract in connection with this project.

The contract, for an unspecified amount, was let to a group of contractors: Lindgren & Swinerton, San Francisco; Tucker McClure, San Francisco; and A. S. Vinnell, Alhambra, Calif. It may be that other contracts will be awarded in connection with this job, but it's not expected that they will be announced.

The Pan-American highway project calls for construction of some 600 miles of road to fill in still-existing gaps in the 1,600-mile highway. Congress recently authorized expenditure of $20,000,000 on this project, and the State Department has worked out agreements with the Central American governments for joint construction.

This money, of which $7,000,000 is immediately available, will be used for construction of a permanent highway. The U. S. Public Roads Administration will work with the Central American governments on construction of the permanent highway.

Meanwhile, however, the same course is being followed on this project as on the similarly strategic Alaskan Highway. The Corps of Engineers, using engineer troops, is running through a pioneer road, designed to be barely passable and no more. It will be perhaps ten feet wide, will tolerate 10 percent grades where that is necessary to get through. In most cases, however, it will stick to the projected route of the permanent highway to be built later.

Alaska by Christmas?

Rate of progress being made by the Army engineers on the pioneer road for the Alaskan highway was suggested last week when Chairman Chandler of a Senate military affairs sub-committee, just returned from Alaska, said that the road, now about half finished, would be complete by December. War Department spokesmen had no comment.

McNutt freezes Western lumber, metals labor

The first step toward "freezing" of labor in essential industries was taken last week when the War Manpower Commission declared twelve Western states a "critical labor area" in which men in the lumber industry and working in copper and other non-ferrous metals may not switch to other jobs without a "certificate of separation" issued by the U. S. Employment Service.

The plan sets up machinery of appeal to safeguard workers and employers, and recourse to appeal is also provided for workers who apply for employment in designated industries and are rejected. The scheme is known as an employment stabilization plan, and is designed to halt pirating and migration of labor to better paid occupations from essential lumber and mining industries. More than 200,000 men in Arizona, Colorado, Idaho, Montana, Utah, Wyoming, California, Nevada, Oregon, Washington, New Mexico and Texas are affected.

Explaining the order, Paul V. McNutt, chairman of WMPC, said that log inventories, usually at peak in September, are now the lowest in five years. Critical shortages exist in spruce, Noble fir, Douglas fir, hemlock and Idaho white pine.

Set new record for "Igloo' construction

Pouring 60 beehive-type igloos (*ENR* Mar. 26, p. 498) in 24 hours on Labor Day, the Corbetta Construction Co. and the Del Balso Construction Corp., both of New York City, are believed to have set a new record for this work.

The companies, contractors at the Sioux Ordnance Depot, nearly doubled the previous record of 32 standard type igloos in one day, according to Capt. Perley Lewis, area engineer in charge.

Key West water line placed in service

For the first time in the history of the southernmost city in the United States, fresh water last week flowed to Key West, Fla., through an aqueduct from the mainland 167 miles away.

At the rate of about 2,000,000 gpd. a single pump is pouring water through the $3,000,000 system for flushing and testing only. At full capacity, the line will deliver 3,000,000 gpd. to serve civilian and naval installations. Since a hurricane in 1935 wrecked the old Florida East Coast Railway service, the city has depended on rain-water catchments for fresh water supply.

WASHINGTON HIGHLIGHTS

The National Housing Agency will assign no new housing projects to the Defense Homes Corporation, an RFC subsidiary which it took over the first of this month (*ENR*, Sept. 3, p. 3). The Defense Homes Corporation, it has now been decided, will be a mere liquidation agency winding up the ten projects it now has under construction.

Owners of used construction equipment are required by a WPB order to report on the nature and use of their equipment and to make supplementary reports whenever the use, ownership, or location of the equipment changes. The report, WPB Form 1159, must be submitted before Sept. 30 to the Used Construction Equipment Regional Specialist in the nearest WPB regional office. Change of status reports, on Form 1333, must be made within a week after the change occurs. The reports are to be used to maintain a running inventory of available construction machinery so that it may be allotted to the most essential uses.

The low limits on size of construction work permitted without specific authorization by the War Production Board were somewhat revised last week in amendments to order L-41. The amount of work which may be done in any twelve months without authorization on club and lodge buildings, auditoriums, and similar commercial structures was cut from $5,000 to $200. Work on other commercial structures was cut to $1,000. The order was somewhat relaxed as to multiple dwellings of more than five families; here, the amount was raised from $500 to $1,000. Other changes in the order emphasize that no un-authorized project must be such as to require any use of materials to supply utility service.

Bushell becomes deputy Connecticut road chief

Arthur W. Bushell, of Hamden, Conn., former state highway department director of engineering and construction, has been named deputy state highway commissioner to succeed Frank Upman, Jr., who recently became manager of the Connecticut War Industries Committee at Washington, D. C.

The new deputy commissioner joined the highway department in 1913 as an inspector, served eight years as engineer of contracts and construction, and was district engineer at New Haven. Before joining the highway department, he was an engineer on special surveys for the Philippine government.

OBITUARY

John A. Guissinger, 57, civil engineer of Magnolia, Ark., died at his home recently. He had been an engineer for the Arkansas state highway department for nine years, leaving that organization recently to take private work at an ordnance project near Sidney, Neb.

Albert J. Wheeler, 68, civil engineer of Miami Beach, Fla., died Aug. 31 at Bay Pines, Fla. A resident of Dade county for more than 20 years, Mr. Wheeler surveyed many of Miami's original subdivisions before the boom of 1925.

Harry Carpelan, 68, civil engineer, explorer and amateur scientist, died recently at Los Angeles, Cal. A native of Sweden, he constructed railroads in Brazil, headed an engineering expedition into Siberia and participated in the construction of various projects in the Belgian Congo, Australia and the United States.

Frank H. Bender, 65, retired civil and mining engineer of Philadelphia, died Sept. 4. He was for 30 years Shenandoah division engineer for the Philadelphia & Reading Coal & Iron Co.

John Morgan Bussey, 76, retired civil engineer, Parksville, S. C., died Sept. 4.

William H. Baltzell, 74, retired chief engineer for the American Steel & Wire Co.'s Pittsburgh plants, died at Pittsburgh Sept. 2.

Lieut. Hill Reid Nettles, 37, of the department of civil engineering at the Citadel, Charleston, S. C., died Aug. 31 in New York City. A graduate of the University of South Carolina in civil engineering, Lieutenant Nettles went to the Citadel in 1937.

Ed Mann, 71, building contractor of Birmingham, Ala., died Aug. 30.

Harry Cone Collins, 73, retired structural engineer at Springfield, Mass., died recently at Peak Island, Maine. He had been for many years chief engineer for the Berlin (Conn.) Construction Co.

Thomas H. Waugh, 65, a well known contractor of Carlisle, Ky., died there recently.

Louis C. Meyer, 66, Sioux Falls, S. D., contractor and former city building inspector, died at St. Cloud, Minn., recently.

CONTRACTS AND CAPITAL

ENGINEERING construction volume for the short week due to the Labor Day holiday totals $97,311,000. This compares with $261,671,000 reported for a week ago, and the $139,478,000 for the full week in 1941. Almost 78 percent of the current week's volume is for federal work, 16 percent is private, and the balance is for state and municipal construction. The private volume, $15,920,000, is the largest reported since the week of July 2, 1942.

With this week's construction, the 1942 volume reaches $7,278,879,000, an increase of 60 percent over the total for the 37-week period last year, and 24 percent above the volume for the entire year 1941. Private work, $458,706,000, is 50 percent under the total reported for the period a year ago, but public construction, $6,820,173,000, is 88 percent higher due to the 136 percent gain in federal work.

In the classified construction groups, gains over the 1941 week are in waterworks, sewerage, streets and roads, and unclassified construction. Compared with the preceding week, however, all classes of work are lower.

New capital for construction purposes for the week totals $933,000. This compares with the $428,529,000 in federal appropriations reported for the week last year. The 1942 week's new financing is made up of $897,000 in state and municipal bond sales, and $36,000 in RFC loans for public improvements.

New construction financing for the year to date, $9,524,957,000, is 63 percent higher than the $5,842,664,000 for the 37-week period a year ago.

CONTRACTS

(Thousands of dollars)

	Week Ending Sept. 11 1941	Week Ending Sept. 3 1942	Week Ending Sept. 10 1942
Federal	$103,622	$246,581	$75,522
State & Municipal	20,706	8,821	5,869
Total public...	$124,328	$255,402	$81,391
Total private..	15,150	6,269	15,920
TOTALS	$139,478	$261,671	$97,311

Cumulative
1942......(37 weeks).....$7,278,879
1941......(37 weeks).....$4,559,119

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1941 37 weeks	Cumulative 1942 37 weeks
NON-FEDERAL ...	$1,016,546	$558,059
Corp. Securities..	302,257	169,324
State & Mun.....	335,629	177,580
U.S.H.A. loans...	30,399	......
R.E.A. loans.....	100,500	......
R.F.C. loans.....	84,761	128,455
Fed.-Aid—Highways	163,000	82,700
FEDERAL	$4,826,118	$8,966,898
TOTAL CAPITAL..	$5,842,664	$9,524,957

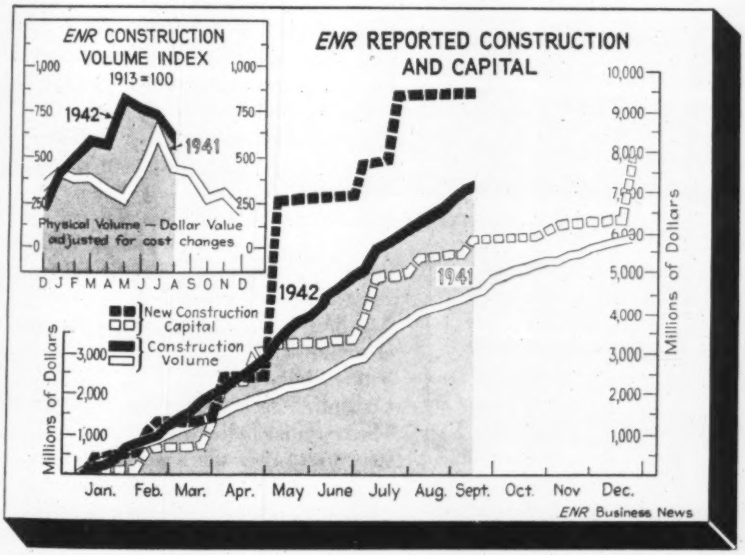
ENR INDEX NUMBERS

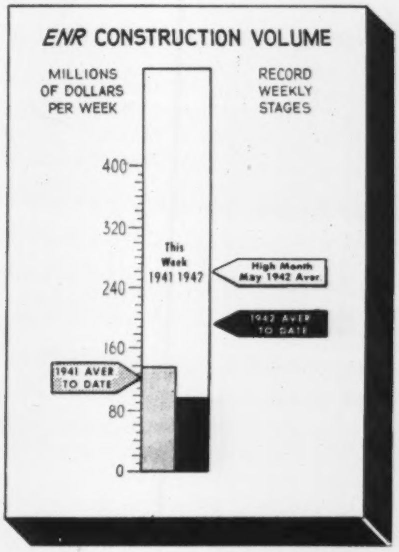
Index Base = 100		1913	1926
Construction Cost..	Sept. '42..	281.61	135.37
Building Cost.....	Sept. '42..	225.46	121.88
Volume	Aug. '42..	622	273

FHA MORTGAGES

	Week Ending Sept. 6 1941	Week Ending Aug. 29 1942	Week Ending Sept. 5 1942
Selected for appraisal			
Title II....	$23,185	$6,296	$6,274*
Title VI...	$2,731	$13,602	$15,050*

*Subject to revision.





Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Too Much Manpower

Sir: I wish to comment on the methods used in wood barge construction as described in *ENR*, Aug. 6, 1942, p. 187, and illustrated on the cover of that issue.

What philosophy do those hold who are in charge of this work to justify this appalling waste of manpower? There are cranes available for such operations.

Here in the West, we operate a large ranching company, and experience an extreme shortage of labor. We have official propositions which would entail putting children to work in orchards and beet fields, to make our product, much of which is perishable, quickly available for our war effort. With a condition such as apparently exists at this barge project, our indignation against the child labor idea is certainly warranted.

Using block and tackle methods, plus brawn, to build wooden barges and lacking enough intelligence to use cranes for heavy placements, are to my mind, the height of folly.

FRANCIS J. STEIDLMAYER
Colusa, Calif.

Increased Steel Stresses

Sir: The present stringency in steel and the necessity for conserving this highly critical material have led to various attempts to reduce its uses for other than war purposes. Naturally enough attempts are being made to reduce the use of structural shapes and reinforcement bars to a minimum, and it has been suggested that one way of bringing about such reduction is to increase the allowable steel working stresses.

There is no doubt that steel working stresses can be safely increased for certain structures, not only for the duration of the war but as a matter of everyday practice. There is also no doubt that for other structures increases in basic design stresses should be carried out only after careful and full study. For example, some building codes require the use in design of excessively heavy floor live loads. It is often certain that such design loads will probably never be exceeded, or even equaled, when the building is put to actual use. In such cases the use of a basic working stress of 18,000 psi. is wasteful, not only in wartime but at all times. On the other hand, a bridge designed now for a standard loading of today may become obsolete within a comparatively short time because of increased live load.

Another good example may be cited. Suppose a steel truss is to be designed. Irrespective of whether the truss is for a building or a bridge, fundamental conditions must be taken into account that need not be considered if beams or plate girders are used. The reference is of course to secondary stresses. It is a well-known fact that secondary stresses in trusses often equal 40 percent or more of the primary stresses. Evidently an arbitrary increase in the allowable working stress will automatically bring about a corresponding increase in the secondary stresses. If the increase in basic working stress is large—some engineers have suggested 24,000 psi.—it is easily seen that the combined primary and secondary stresses could equal or exceed the elastic limit of the material and the factor of safety wiped out.

The particular point that I desire to bring out is that engineers and designers, in their enthusiasm to conserve critical steel, should not let such enthusiasm run away with their engineering judgment. It should be recognized that permissible increases in allowable working stresses are not to be applied to all structures in the same degree, and that for some forms of structures such increases should not be applied at all.

E. M. VINER
Structural Engineer
Providence, R. I.

Ultimate in Pollution?

Sir: In his excellent history of contagions (*Plague On Us*, published by the Commonwealth Fund, 41 East 57th St., New York City) particularly those of the 19th century, Geddes Smith quotes the description of one city's water supply given by a contemporary humorist, which read as follows:

"The appearance and quality of the public water supply were such that the poor used it for soap, the middle class dyed their clothes in it, and the very rich used it for top-dressing their lawns. Those who drank it filtered it through a ladder, disinfected it with chloride of lime, then lifted out the dangerous germs which survived and killed them with a club in the back yard."

My guess would be that the above represents the ultimate in stream pollution.

W. H. KLEGERMAN
Alexander Potter Associates
Consulting Engineer, N.Y.C.

Saving Steel

Sir: The great interest shown in saving steel by a host of your readers, especially in reinforced concrete, is prompted by the general underlying feeling that the basic assumptions of our design lead to excessive safety factors. If a ballot were taken in the profession as to how many times the design load would lead to the failure of a monolithic continuous concrete structure, a factor of six to eight would not be surprising as an expression of opinion.

Naturally, the proportion of dead to live load, as dealt with by A. J. Boase, in his article "Saving Reinforcing Steel by Rationalizing Safety Factors" (*ENR* May 7, 1942, p. 785), would play an important part in such an assessment. But, apart from this, it is generally felt that local loadings are carried even by distant members of a structure, and that most local stresses we compute are simply not there.

Practically all our theory is based on laboratory tests under clear-cut bearing conditions, while such conditions seldom arise on a building job. Even lengthy computations do not lead to economical structures, because they are based on the fiction that the elastic theory applies, which is the case only to a certain extent. Tests made on behalf of the British Building Research Station by W. H. Glanville and F. G. Thomas dealt with lucidity in R/C of the Portland Cement Association, June 1941. These studies indicate that continuous structures, after the bearing capacity as computed by the elastic theory is exhausted, adjust themselves by plastic deformation, other sections than the most stressed ones take over, and failure occurs at several times the assumed ultimate load. In some instances, five times the designed ultimate resulted in failure of the test structure.

The tests made dealt merely with frames and continuous beams with two spans. If multiple continuous structures were tested, it is hard to say how many times the designed ultimate load would be absorbed, due to the manifold possibilities of plastic adjustment. If one section helps others in carrying the load, our method of designing for the maximum moment and slightly decreasing the section, if at all, for the lesser ones, surely adds to our safety factor.

Translating the above-mentioned failing load in the test—five times the computed failing load—into imaginary stresses, would mean that steel with a yield point of 40,000 psi. in the testing machine, stands 200,000 psi. in the actual structure. This sounds perfectly absurd, but checks very well with the belief that actual continuous reinforced-concrete structures can stand much more than twice the design load before failing. Thinking in terms of loads is something real, while stresses are imaginary, computed on many assumptions as to the behavior of the two materials, steel and concrete, in the same section. That is one of the reasons why the method recommended by Mr. Boase is so appealing and could be carried much farther.

If we could afford to load to failure actual reinforced-concrete structures, built in a routine way, we would have a better idea as to how far we can go. The writer had to make loading tests on a floor of 56,000 sq.ft., out of which about one-half was heavily overloaded by mistake, carrying in places several times the design load.

Good-sized exhibition brick homes with rockery gardens all around had been placed on a suspended floor designed for 200 lb. per sq.ft. on bays 20 by 30 ft. The weight of the visitors expected was to be added to the weight on the floor. The alternatives were either to dismantle the exhibits or to put an additional test load on the floor, representing the weight of the expected crowd. The latter course was adopted, practically every beam being loaded and partially unloaded under observation several times before the exhibition opened. The deflections did not exceed 1/1500 of the span at any place, and the exhibition took place according to schedule.

It should not be difficult to obtain similar examples in the profession. These should be very instructive and throw light on the real safety factor we require. All of our calculations of strength are based on approximations forming a world of paper formulas, which we have grown into taking as realities. They have protected us from failures, due to high safety factors.

To achieve the right balance between reasonable safety and the stringent necessities of this emergency, we must correct them by closely watching the performance of our materials in actual use.

L. Kauf
Washington, D. C.

Cantilever Bridge Virtues

Sir: The writer is in agreement with Mr. Charles H. Woods' article, "Cantilever Girders Preferred" (*ENR* Aug. 13, 1942, p. 235). The saving of materials for continuous structures of span lengths given in this article is negligible, although the moment areas may be somewhat less.

Saving in steel can be effected in truss spans of 300 ft. or greater. Here the moment areas are less for the continuous trusses, but when the floor system, bracing and nominal sizes of shapes are taken into consideration in the total weight of steel, this saving is small.

In long spans the continuous trusses are more difficult to erect, not only from the standpoint of falsework, but also from the adjustment of reactions and the jacking of truss members into position.

Taking everything into consideration, except possibly deflections, which are very important in long spans, the cantilever bridge is probably the most desirable structure. One feels certain that the truss members are taking their allotted stresses, not only during erection, but after the structure is completed.

Norman C. Raab
State Department of Public Works
Bridge Department
Sacramento, Calif.

Steel Specifications

Sir: An error is noted in G. M. Zucco's interesting letter on "Saving Steel by Higher Stresses," in that A. S. T. M. specifications for standard carbon structural steel referred to—A7-34, Structural Steel for Bridges and A9-34, Structural Steel for Buildings—have been superseded by a single specification, A7-39. This current specification provides for a minimum yield point of 33,000 psi. and an ultimate strength of 60,000 to 72,000 psi., as did the two specifications replaced, but it is well to keep the record straight.

A7 steel may be made by either the open-hearth or electric furnace processes, and steel for plates and sections $\frac{7}{16}$ in. and under in thickness, intended for use in buildings and other structures subject to static loads only, may be made by the acid-bessemer process, unless otherwise specified. A7-39 was approved as an American Standard by the American Standards Association, A.S.A. No. G24-1939.

It also may be noted that the A.S.T.M. Standard Specifications for Structural Steel for Ships, A131-39, provides for a carbon steel similar in all respects to that made for bridges under A7-39, except that there are some slight differences in the requirements for bending tests.

F. H. Frankland
Director of Engineering, American Institute of Steel Construction, Inc.
New York, N. Y.

Stronger Bridge Fenders

Sir: Your editorial "Stronger Bridge Fenders," in *ENR*, Aug. 27, 1942, is very timely. The destruction of the lift span over the Chesapeake & Delaware Canal at St. Georges, Del., was obviously the result of insufficient fender protection. Published photographs showed that the vessel got between the tower pier and the shore and was able to take out the shore span. There is no apparent evidence of any fender construction to prevent such an accident. This lack of protection was so glaring a defect that it is amazing that correction was not made immediately in the case of other similarly vulnerable structures on this canal before the accident at Chesapeake City could occur.

It is to be expected that prompt action may be taken in the case of any other such span upon this important waterway.

Francis P. Witmer
Director (on leave of absence)
Department of Civil Engineering
University of Pennsylvania
Philadelphia, Pa.

EDITORIALS

VOLUME 129 NUMBER 11

September 10, 1942

Men and Jobs

IT WAS INEVITABLE that the War Manpower Commission should have to take over the allocation to war work of engineers and other technically trained men. Nominally this control is still voluntary (*ENR* Aug. 13, p. 204), but the WMPC has the authority to make it compulsory whenever it so chooses. Pirating of skilled men already has had a serious effect on many war operations. The only way to stop it is by some such system of centralized control of the employment of skilled men in war industries. Looking into the future, the next step may be the requisitioning of men from less essential occupations to fill jobs in war industries. Basic information for such an operation was collected months ago by state and national engineering and professional societies and is now recorded in the National Roster of Scientific and Professional Personnel, which has been taken over by the War Manpower Commission. Men who see their present jobs folding up or who would like to get into defense work should see that their records with the WMPC in Washington are up to date and that the fact that they seek more useful service or need a war job is recorded with the U. S. Employment Service.

Every Little Bit Helps

IN DRASTICALLY REDUCING the cost limits for new construction that private builders may undertake without specific authorization, the WPB has taken cognizance of the huge amounts of materials that are being used in this type of work. Taken singly, the jobs are insignificant, but multiplied thousands of times they cause a substantial drain on building materials supplies. Reducing the cost limits on residential work from $500 to $200, and on commercial buildings, highways and utilities construction from $5,000 to $1,000 will effect a lot of little savings. Added together they become important. And now that its interest in small savings of construction materials is aroused it may be expected that the WPB will soon turn its attention to the caches of such materials that are believed to exist in many parts of the country. What, for example, has happened to the stores of nails, paint, roofing, reinforcing bars and miscellaneous materials that were left over on Army cantonment jobs? Some of these stores must be far beyond reasonable maintenance requirements. How much material do contractors have in their material yards? Some of these may be overstocked. The same question may be directed to cities. If the time has come when every little bit helps, no one can be allowed to retain more materials than are required for absolutely essential needs.

Little Sources Not Enough

ALTHOUGH little things multiplied many times usually bulk large enough to be significant, as in the case of materials, this does not always mean that they can fill total requirements. Such is proving to be the case with collections of steel scrap. The cellars and backyards of the homes of the nation have given up a substantial tonnage, but it falls far short of what is needed. Some 13,700,000 tons of scrap were shipped to the steel mills from all sources in the first six months of the year. The WPB has estimated that 17,000,000 tons must be collected and shipped in these last six months. Such a large increase cannot be made up by small household contributions. Bigger single sources of scrap must be found. Perhaps one of these sources may be the equipment graveyards of large construction contractors. Such organizations, unlike the railroads and industrial plants, have never made a practice of systematically collecting and selling their scrap. If they have not already done so, now is a good time for contractors to clean up their junk piles. They can never put them to better use.

Heartening Decision

THE WAR PRODUCTION BOARD'S DECISION to deny high priorities to many power projects (*ENR* Aug. 27, p. 271) will give heart to those who have long wondered whether the war was not being used as an excuse for needless expansion of public waterpower development. Despite general orders to curtail all construction not immediately connected with the war effort, the go-ahead signal appeared to be available to any project that would provide space for a power turbine, seemingly without regard to the power needs of the region in which the project was located. Work on a few of these projects now is to be abandoned; on others, construction that can be carried forward without high priorities is to be continued. Similarly, work on steam stations in regions where serious power shortages have not developed is to be shut down. This will clear the way for work on turbines and generators for regions lacking adequate power sources as well as for power equipment for the nation's great shipbuilding program. Clarification of this power puzzle, though long overdue, is greatly to the credit of the power division of the WPB.

Sewage Sludge for Camouflage

GENERALLY SPEAKING, war needs create rather than solve problems. But the genius (he must remain anonymous for the duration) who suggested the use of dried sewage sludge as a ground cover camouflage material solves two problems at one fell stroke. Disposal of sludge from sewage treatment plants always has been a No. 1 headache for municipal authorities. It can be burned, but that calls for expensive incinerator equipment; and it has good soil-conditioning qualities, but people won't even take it as a gift because of a psychological aversion based on its origin. As a result, sludge piles have mounted ever higher. Now we learn that the dark-colored sludge has been found ideal as a cover material to obliterate the reflecting qualities of light-colored soil exposed around the site of a recently built industrial plant. Picture the joy in one city hall when the request was made for some 30,000 tons of sludge to camouflage this plant. If this camouflage idea takes hold, municipal sewage treatment plants may find that they are producing a strategic material.

Roads to Alaska

REPORTS FROM RETURNING SENATORS that the Alaskan Highway will be completed by Dec. 1, appear to give the lie to the pessimists who predicted that a road could not be built along the route selected by the Army because of the "hundreds of miles of muskeg" to be crossed. So much is being said about the Alaskan Highway, and so little of it by the military authorities in charge of the road, that it is timely to set the record as straight as available facts will permit.

Ever since the road now being built was begun (*ENR* March 12, p. 389, and April 2, p. 515), a group of men led by Senator Langer of North Dakota has actively opposed its construction, even going so far as to charge that the Army General Staff had been hoodwinked into selecting an impractical route. The only practical routes, these men insist, are the two selected by the commissions set up by the American and Canadian governments a few years ago to report on highway connections to Alaska. Those routes, lying through valleys much closer to the Pacific Coast, were chosen to meet civilian requirements. In contrast the present road is a military road; and if a prediction may be ventured, it will be many years before it is anything else.

Military needs then, not peacetime considerations, dictated selection of a route that starts at the northwestern corner of the Canadian prairie region instead of farther west and south in the mountains of British Columbia. Indeed, this fact was brought out at recent Senate committee hearings by Brig. Gen. C. L. Sturdevant, Assistant Chief of Engineers, and Col. J. K. Tully of the General Staff, who emphasized that a road along that route will serve the isolated airfields by which airplanes are ferried to Alaska, making it unnecessary to fly in fuel and other supplies.

As to the muskeg, the amount to be encountered was anybody's guess when the route was selected, since most of the line had never been surveyed except from the air. At the hearings, General Sturdevant stated that locating parties were finding that much of the muskeg could be avoided by shifting the alignment around the low marshy areas. Also, it should be noted that Canadian engineers have built many miles of highways and railway over the marshy lands that they characterize as muskeg. Their experience is easily available to our army engineers. That it has been used seems apparent from the report that a road will be open before the end of the year.

What is generally overlooked in most of the current discussions is that the road now under construction is but the forerunner of other roads and possibly a rail line to Alaska. Through part of Yukon Territory and from the Alaska boundary to Fairbanks, the road now being built follows one of the routes favored by the Alaska International Highway Commission. Construction of a highway along that route, therefore, has been greatly simplified by the work in hand. The main issue now is not what route to follow but how to provide the maximum amount of transportation service in the least possible time. The road to be opened this winter will materially advance that objective.

ENGINEERING NEWS-RECORD WALDO G. BOWMAN, *Editor*

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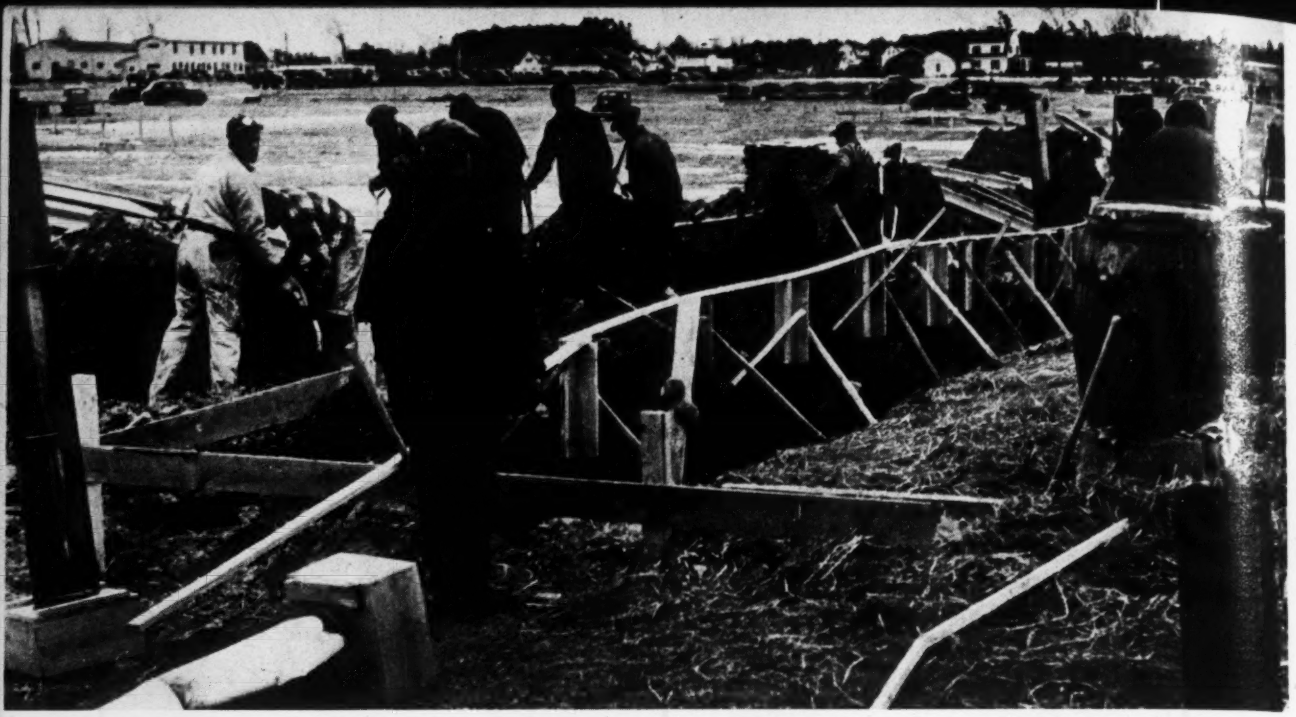


Fig. 1. Stovepipe, with forms attached, are placed to form footings and pedestals. Wood braces protect pipe while backfilling.

Stovepipe Forms Speed Winter Concreting

Contents in Brief—*In building at 20 deg. below zero the foundations for 150 barracks and officers' quarters, a New England contractor greatly expedited the work by using metal stovepipe to simplify the formwork. Installation of the forms followed the excavation as soon as possible and backfilling was begun immediately after that work. Once the concrete was in place, a lantern was set at the base of each pier and the pier and its lantern covered by a wooden barrel. Later work showed that still more satisfactory results could be obtained by using cylindrical cardboard forms.*

STOVEPIPE FOR FORMS, an old steam shovel to heat the water and aggregates, and heat generated by kerosene lanterns to keep concrete warm were the means by which cold-weather construction was accomplished on foundations for 150 barracks and officers' quarters at three New England War Department projects. Some 4,000 individual foundations were built during a severe winter when concreting at 20 deg. below zero was necessary.

Most of the foundations consist of an 18-in. square footing 1-ft. thick surmounted by a 12-in. dia. pedestal from 2½ to 5 ft. in height. The form for the footing was of wood construction, but for the upper part sheet-metal stovepipe in 2-ft. sections was employed. In building a form the pipe sections were fitted together and then the lower end of the pipe inserted in the wooden base and nailed in place.

Excavation for the footings was mostly with a trencher and the forms were set in place as soon as possible thereafter. Backfilling, which was by hand, followed immediately. During this operation a wooden brace, known on the job as a "torpedo," was inserted in each form to keep the pipe sections from collapsing due to external pressure (Fig. 1).

Lanterns used for heating

When possible, placing of the concrete followed as quickly as the forms were in place, but for the most part this operation was not carried out until the next day. When concrete was not added immediately, a kerosene lantern was suspended in each stovepipe a few inches above the bottom of the footing. The lantern kept the form warm and the method of support prevented the flame from being extinguished in case water seeped into the bottom of excavation. The lantern hung from the short length of board used to close the top of the stovepipe, and a small hole was always required in the top cover to admit necessary fresh air to keep the lantern burning.

Regardless of what time of day the concrete was placed, the water and aggregate for the concrete were heated by steam coils connected to the boiler of an old steam shovel (Fig. 2), which could travel about the site under its own power. To facilitate movement of the shovel and make it less cumbersome, the boom and dipper were removed.

Ordinarily a two-bag mixer was used and the foundations for four buildings were generally constructed at one time. The concrete left the mixer at a temperature of about 100 to 110 deg. and was placed at 80 to 90 deg. Distribution to the individual piers was by wheelbarrow and placing by hand-shovel.

Barrels protect foundations

As quickly as concrete for a pier had been placed, a kerosene lantern was set at the base of the pier, and a 55-gal. wooden barrel was placed over the foundation and lantern (Fig. 3). This assisted in maintaining the concrete's temperature above 50 deg. and in many cases kept it between 60 and 70 deg. Use of high-early-strength cement required that the barrels and lanterns be kept in place only 24 hours. After removal of the barrels, no attempt was made to salvage the stovepipe sections for use on another pier.

In some cases the pier was so tall that in the event a barrel were used it would not have touched the ground, and with these foundations some other method had to be used to protect the concrete. In such cases two large heavy paper bags of the type used in New England to transport coal were employed. In using the first one a lantern was set beside the pier and the bottom cut out of the bag, which was then pulled down over the lantern and the lower part of the pier. The second bag then was added to protect the pier's top, the bottom of this bag not being cut away. This proved equally effective in retaining heat and no fires occurred. However, it was more time-consuming to use the bags in lieu of the barrels.

For most of the buildings some reinforced-concrete walls were required and the aggregate and water for this concrete also were heated. When the concrete had been placed, the walls were covered by tarpaulins and kept warm with salamanders. This method proved equally satisfactory for this part of the work.

With the methods just described the rate of progress was excellent. A 20-man crew in a 10-hr. day was able to mix and place the concrete for all the piers and walls for two 63-man barracks, which meant about 80 footings in all.

Cardboard forms satisfactory

On a later project, the same contractor used 14-in. dia. cylinders of ¼-in. thick cardboard for constructing the forms for the individual footings. These cylinders were used only during warm weather when protection against low temperatures was unnecessary. However, this experience was sufficient to show that the cardboard forms would have been more satisfactory than metal stovepipe for several reasons.

These include: (1) a saving of critical materials results from use of cardboard cylinders; (2) a reduction in the cost of the materials is possible; and (3) a saving of time and labor follows, since to place a brace inside the cardboard cylinders during backfilling operations is unnecessary and to cut the cardboard forms to the desired length is much easier than to prepare the correct length of stovepipe.

The work described was done by the Boston District, Corps of Engineers, U. S. Army, with Col. L. B. Gallagher, district engineer; John E. Allen, chief of engineering; F. Stuart Brown, chief of design; and R. E. Payzant, area engineer. T. W. Cunningham, Bangor, Maine, was the general contractor on the three jobs mentioned.

Fig. 2. Aggregate and water for the concrete work are heated by the old steam shovel at the left. As quickly as a pier is completed, it is covered by a wooden barrel that also houses a kerosene lantern.

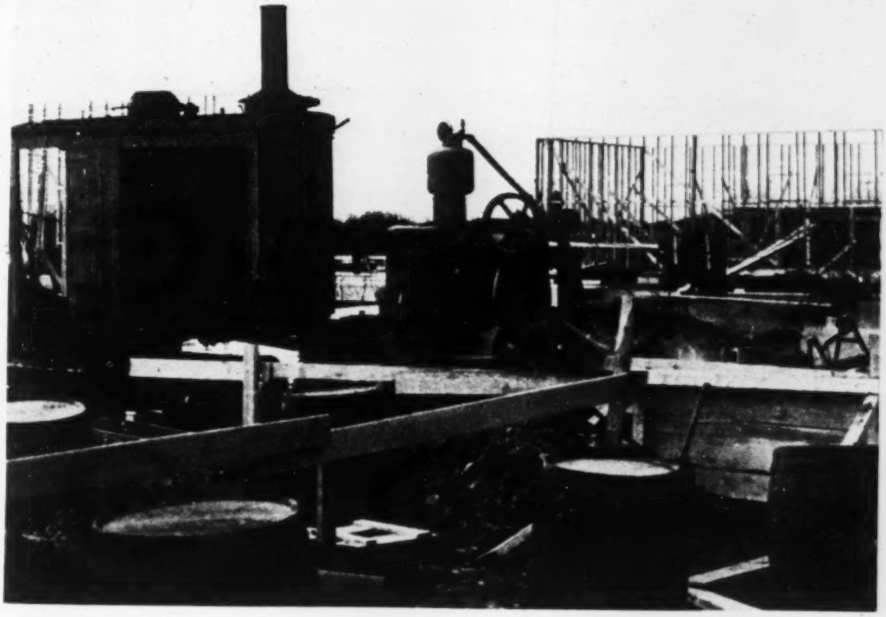
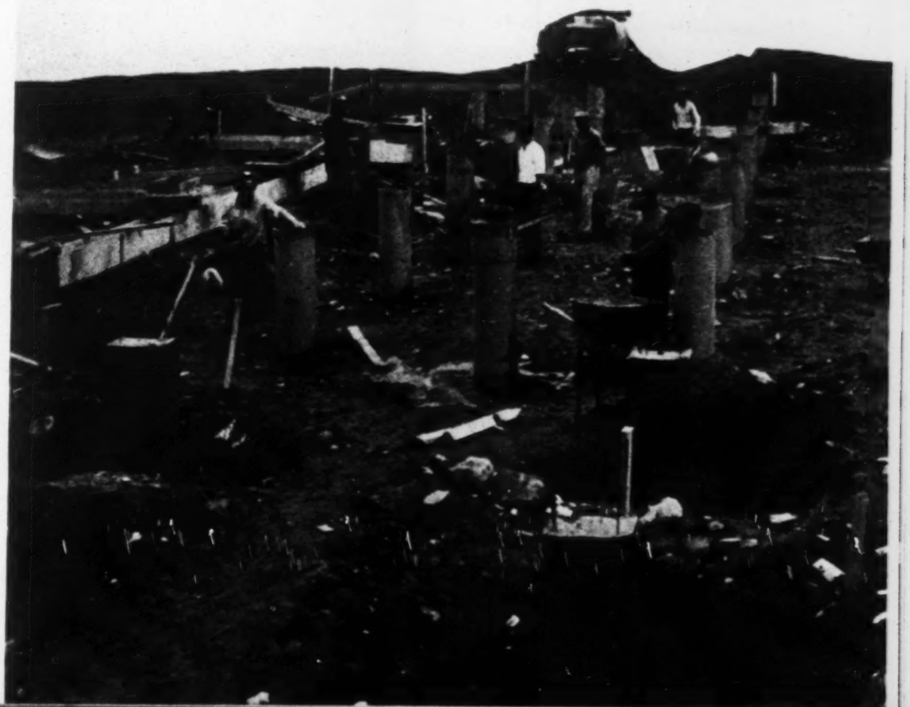
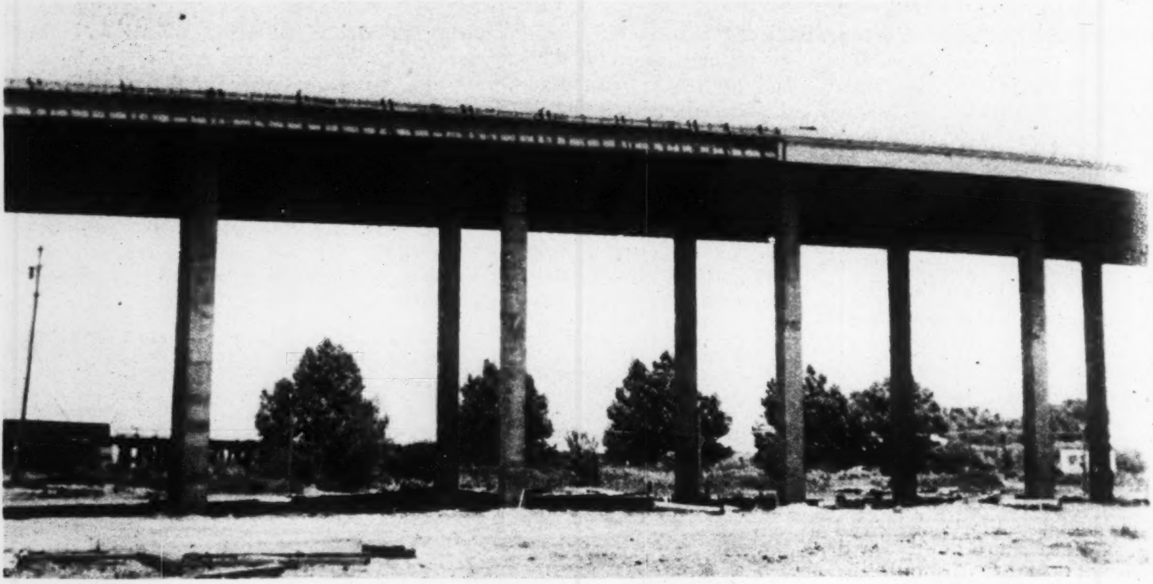


Fig. 3. During a later stage of the foundation work cardboard cylinders replaced the stovepipe forms for the cylindrical piers. This method was found faster and more economical.





North Sacramento viaduct has no unnecessary members. The 3-ft. square columns attain a maximum height of 50 ft.

An Overpass with Minimum Obstruction

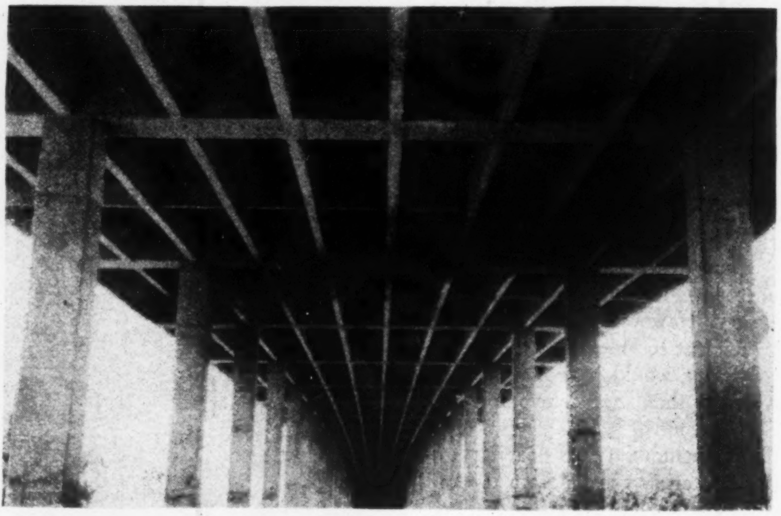
***Contents in Brief**—Reinforced-concrete supports for an overpass at Sacramento, Calif., are simplified to a pair of concrete columns per bent, without braces and with concealed caps. Columns are 50 ft. high and are designed to be earthquake resistant.*

In the Design of the North Sacramento viaduct, a part of an intercity elevated highway connecting Sacramento and North Sacramento, Calif., it was highly desirable to avoid the impression of a "forest" of supporting columns, braces and bents. The designers therefore were instructed "to minify obstructive characteristics by (1) using as few columns as possible, (2) eliminating all possible bracing, and (3) making the superstructure as slender and ribbon like as practicable."

In meeting these requirements the bents have been limited to the bare necessity of two clean columns. These columns, although reaching a maximum height of 50 ft., are only 3 ft. square. They are designed for a horizontal seismic force of 0.04 g in addition to the usual wind and tractive forces. The only bracing between the two columns of a bent is that formed by the cap that rigidly attaches the columns to the superstructure, and by a strut that ties the two columns together at or below the ground level.

The over-all width of the superstructure is about 65 ft., which includes two 25-ft., two-lane roadways, a 4-ft. median strip and two 4-ft. sidewalks. An open steel railing is used, which gives maximum visibility and conforms in its architectural simplicity to the structure as a whole. (This railing was fabricated before restrictions of wartime were placed on steel shapes.)

For purposes of design the columns were considered fixed at the top and hinged at the bottom in the longitudinal direction. In the transverse direction they were considered fixed both top and bottom. Expansion joints in the deck were placed at



Underside view of the deck shows the absence of diagonal bracing and how the column caps are concealed in the floor structure.

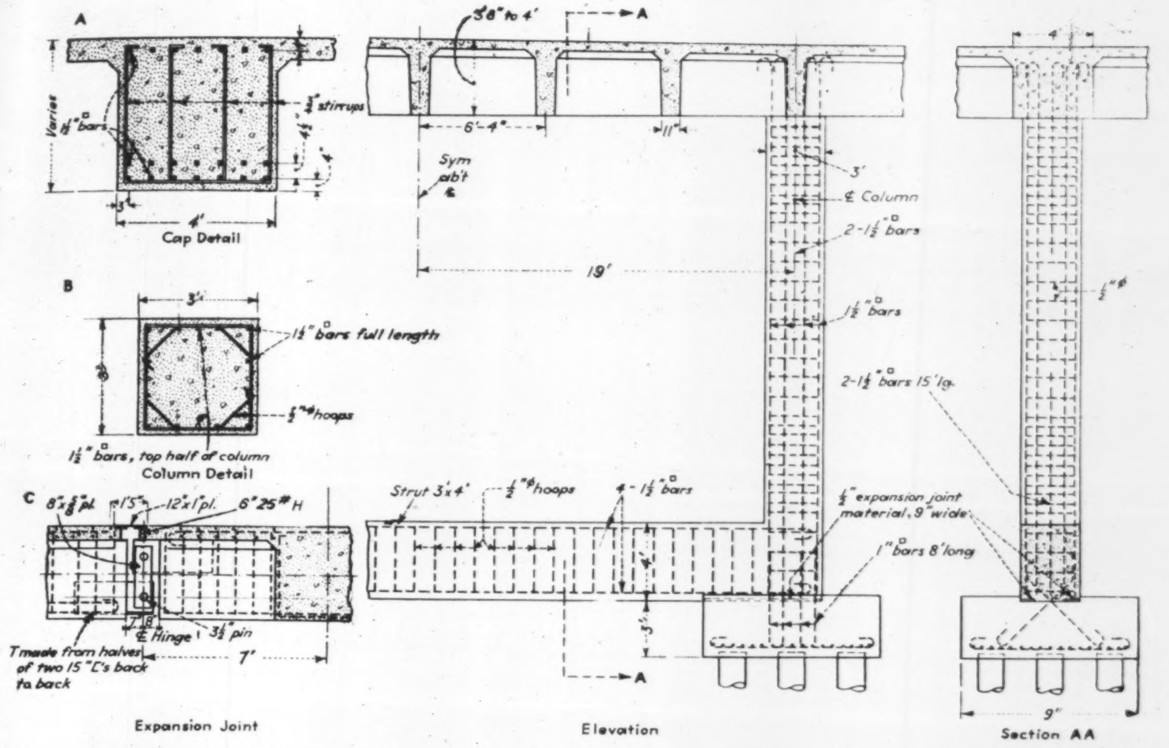

A
Varies
1½" bars
¾" stirrups
4½"
4"
3"
4'
Cap Detail
B
3'
3'
1½" bars full length
½"ϕ hoops
1½" bars, top half of column
Column Detail
C
8"x⅝" pl.
1'5"
12"x1" pl.
6" 25# H
7"
8"
℄ Hinge
3½" pin
T made from halves of two 15" ⊏'s back to back
7'
Expansion Joint
3'8" to 4'
A
6'-4"
11"
Sym ab't ℄
19'
3'
℄ Column
2-1½" bars
1½" bars
2-1½" bars 15' lg.
Strut 3'x4'
½"ϕ hoops
4-1½" bars
4'
3'
½" expansion joint material, 9" wide
1" bars 8' long
A
Elevation
4'
½"ϕ
9'
Section AA

Fig. 3. Details of the North Sacramento viaduct. Columns fixed at the top and considered hinged at the bottom. Deck expansion and contraction are taken by pinned steel hangers placed at 160 to 200-ft. intervals.

about 200-ft. intervals, which required that many of the columns be designed to take large deflections from expansion and contraction.

The caps, whose 38-ft. span supports the structure between columns, were made the same depth as the girders framing into them so that the caps could be concealed within the deck structure. The 41-ft. span of the girders from bent to bent required a depth of 3 ft. 8 in. to 4 ft. This made it possible to give the deck a ribbon-like appearance, when viewed from the side, with the bottom surfaces of caps and girders in the same plane with the tops of the supporting columns.

On tangents the roadway is crowned to drain both ways from the median strip on a 1 percent grade. On a curve near one end (1,500-ft. radius) the drainage is entirely across the 54-ft. roadway on the 8 percent grade formed by the superelevation. Sidewalks, however, retain the 1 percent drainage slope even where the roadway has the 8 percent slope.

Although priorities have quite generally curbed the construction of overpasses, the California Division of Highways points out that by simplifying construction features, as has been done on this structure, it should be possible to plan for future construction of elevated roadways that will impose but little obstruction on areas they traverse.

Floor Covering Failures Related To Humidity and Temperature

As part of an investigation of the important properties of floor coverings conducted by Percy A. Sigler, Robert I. Martens and Elmer A. Koerner, at the Bureau of Standards, the effects of changes in atmospheric conditions on the dimensions of floor coverings were determined. The specimens were exposed to relative humidities ranging from 8 to 86 percent, and temperatures from 32 to 90 deg. F. The coverings included such general types as linoleum, cork, rubber, felt base, asphalt, strip wood, plywood, fiberboard and several monolithic compositions.

In Building Materials and Structures Report BMS85, the test procedure is described and the results, showing the relative dimensional changes and consequent failures are presented in graphic form.

Changes in relative humidity affect the dimensions of many floor coverings to a much greater extent than do changes in temperature within the range usually encountered in structures. However, the dimensions of asphalt tile and rubber are not appreciably affected by changes in either relative humidity or temperature. Strip wood, linoleum and felt-base coverings show a much greater dimensional change in the across-grain or across-machine direction than in the grain or machine direction. The dimensional changes of the strip-wood floorings in the across-grain direction were by far the greatest. The several monolithic compositions, such as cement mortar and magnesium oxychloride, showed only small changes in dimensions.

Copies of BMS85 are obtainable from the Government Printing Office, Washington, D. C., at 10c. each.

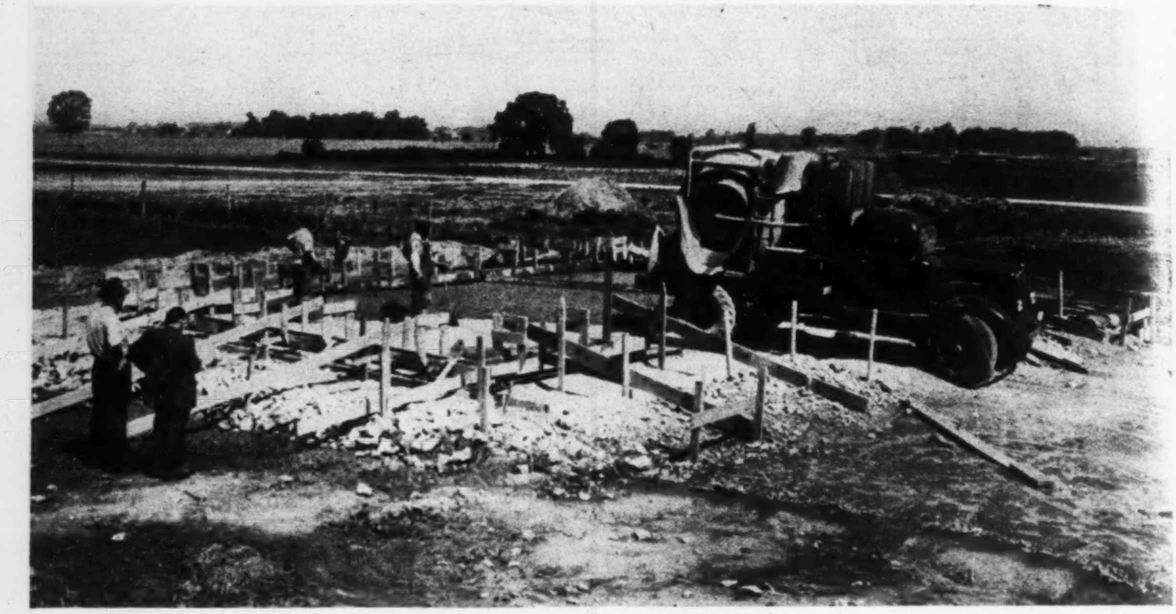


Fig. 1. Pouring slab foundations without footings. Truck mixer backs over compacted base.

War Plant Buildings Without Footings

Contents in Brief—*Unreinforced-concrete floor slabs, integral with wall sills and column pedestals, but without footings, form the foundations for most buildings at an Ohio ordnance plant. Slabs have thickened edges for large buildings; trucking aprons are poured with floors. Topsoil is skimmed off at building site and replaced with compacted clay. Slab base is two 5-in. layers of compacted stone topped with fine stone, raising the slab above ground for drainage. Design is based on soil and concrete studies.*

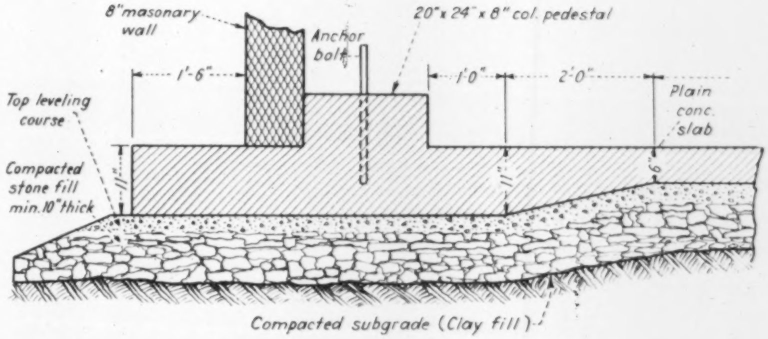
Departing from the tradition of placing footings under building walls and columns and pouring the floor slabs separately, the engineers for a large ordnance plant in Ohio designed the foundations for most of the project buildings as 6-in. plain concrete floor slabs, combined with wall and column supports, built on a raised compacted base of clay and crushed stone. The only excavation required is to skim off the topsoil under each building. Aprons, wall sills and column pedestals are poured integrally with the concrete floor slab without reinforcing of any kind. The design, based on studies of soil mechanics and old concrete slab installations in the vicinity, is extremely economical and permits fast construction. Building sizes vary from 33x45-ft. storage houses to 50x500-ft. manufacturing buildings. No expansion joints are used, regardless of size of floor slab.

The topsoil, excavated deep enough to remove all organic material, including roots, is replaced with selected clay compacted to a density equal to that of the underlying clay, at least back to original ground level, and sometimes higher. Then two courses of crushed stone, crusher run maximum 4-in. size, each course compacted to 5-in. thickness, are placed above the clay subgrade, leveled off with a compacted top course of fine stone, maximum 1-in. size. The concrete floor slab, 6-in. minimum thickness, is placed on the raised base. Edges under heavy walls are thickened to 11 in. and under trucking aprons to 8 in. This type of foundation is likened to a roadway surface upon which the structure is placed. The raised base provides perfect drainage around each building.

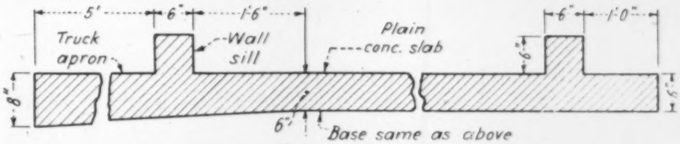
The adoption of such a design was handicapped by lack of precedent. Departure from the standard practice of placing footings below frost line for all structures warranted a thorough soil investigation. Favorable to the slab-type foundation was the presence of a stiff clay deposit overlying bedrock, which, in view of the relatively light weight of the structures to be built, eliminated the necessity of separate footings to prevent settlement or rupture of the underlying soil. Time saved in omitting the separate footings is a big item on this project, and the saving in cost is also important.

Soil studies made

Yet knowledge that certain types of soils, under seasonal variations in humidity and temperature, heave enough to disrupt the ground dictated caution in adopting the design. Frost action on numerous concrete highway slabs is an example of what might happen. Therefore, studies were made by a soils expert as to the causes of frost action and the possibility of frost damage to the foundation slabs in this locality. Because of the light loads involved no concern was felt for the bearing capacity of


8" masonary wall
Anchor bolt
20" x 24" x 8" col. pedestal
1'-6"
1'-0"
2'-0"
Top leveling course
Plain conc. slab
Compacted stone fill min. 10" thick
11"
11"
6"
Compacted subgrade (Clay fill)

Foundation For Large Building



Floor Section For Small Storage Building

Fig. 2. Details of the unreinforced-slab foundations built on a compacted base.

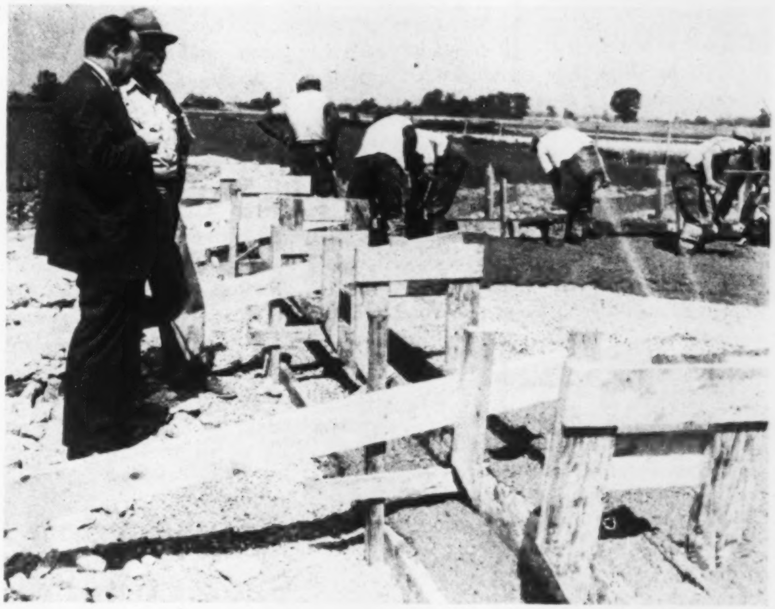


Fig. 3. Wall sill forms are carried on stakes and are tied with wood collar clamps.

soil, so the frost studies were made on the basis of an unloaded soil.

The soils engineer reported that one cause of ground heaving, that resulting from change in soil moisture content between wet and dry seasons, did not need to be considered in this locality. Frost action was the only concern. He explained that frost heaving is the result of growth of ice crystals into lenses in the upper part of the soil, which may swell to a volume several times greater than that of the original soil mass. This often results in a heave of considerable magnitude. Melting of these lenses causes the well-known frost boils on highways.

Three conditions for frost action

Three conditions are necessary for frost action: (1) Fine material with corresponding small voids to support capillary action for feeding the ice crystals; (2) Difference in temperature of soil at surface and at groundwater level sufficient to produce freezing above groundwater; (3) Sufficient groundwater to feed the growing lenses, and a soil not too impervious to furnish the necessary water. Absence of any one of these conditions eliminates frost danger.

Thus the interior of heated structures is not in danger; only the edge of such buildings and unheated floors are to be considered. On this project the clay is fine enough to produce capillary movement, and the groundwater level is close enough to the surface to supply water for frost action. Field surveys and tests were made on the soil, because the ground in its natural state is cracked and fissured, and laboratory tests on disturbed samples would not reveal true field conditions.

It was found that soil conditions over the site were fairly uniform. The top layer, 6 in. to 1 ft. thick, is topsoil or weathered clay. Beneath this is a 4-ft. layer of fissured clay, yellow and blue, which caused most concern over condition of the soil for the slab foundations. Next below is a layer of plastic clay, and bedrock lies from 4 ft. to an unknown depth below 40 ft. Groundwater level is fairly uniform 3 ft. below the surface. A study of geology in the surrounding country revealed similar soil conditions, so studies of structures in a nearby town were considered pertinent.

While no structures in the immediate vicinity are exactly like the designed foundations, numerous concrete slabs serve as good examples. Inspection was made of scores of barn and garage floors, sidewalks, roads, filling stations and materials yards of all sizes and ages. In no case was serious cracking of the concrete slab or settlement or heave evident. The conclusion was reached that frost action in this area is not damaging to concrete slabs.

From these investigations the soil engineers were satisfied concrete foundation slabs could be built directly on the natural ground after the top vegetation was removed, but in the interests of safety they recommended a few simple refinements in construction. Because organic material is highly compressible, the topsoil should be removed to a minimum depth of 6 in. and replaced by more suitable material. To prevent water pockets beneath the slab, the fill should be at least as impervious as the removed topsoil, preferably a clay compacted at a moisture content near the optimum, from the surface of the subgrade to the elevation of the surrounding ground surface. Above the subgrade, to the under side of the slab, should be a material capable of distributing concentrated loads to the subsoil without undue distortion which would crack the concrete slab. An ideal material for this purpose is crushed rock, not over 4-in. maximum size, in a compact state. Crushed rock is also free draining, eliminating complications due to percolating water.

As certain structures will have wall loads up to 4,500 lb. per lin. ft., or column loads up to 35,000 lb., studies were made of the possible effect of such loads on the slab foundations. Confined compression tests in the laboratory indicated a settlement of ⅛ in. at the surface of a compacted clay fill 1 ft. thick under a load of 4,000 lb. per sq.ft. This amount is considered tolerable, especially as two-thirds of the calculated column load is produced by wind, snow or other transient loading.

Assuming a concrete slab thickness of 6 in. a compacted rock fill from 8 to 10 in. thick was recommended for distributing the concentrated loads to keep the soil loading below 4,000 lb. per sq.ft. Local increases in slab thickness were suggested for large load concentrations, but abrupt changes in slab thickness are not desirable to prevent cracking. Similarly, large variations in crushed stone thickness are discouraged to avoid marked changes in the base rigidity.

Specifications

From the investigations and recommendations made by the soils division, specifications for constructing the foundation slabs were drawn up by the engineers. Pertinent points in these specifications are summarized in the following:

Clay fill: Material for clay fill shall contain no vegetable matter or topsoil, and shall be obtained from locations designated by the architect-engineer. Clay shall not possess a liquid limit in excess of 60 or a plastic limit in excess of 33 as established by laboratory tests.

Rock fill: Material shall be clean, sound, durable limestone of 4-in. maximum size, and not more than 20 percent by weight shall be less than 1 in. Limestone screenings or crushed limestone of 1-in. maximum size shall be used for the top leveling course. In no case shall clay, topsoil or other similar material be used for the leveling course.

Excavation: Carried to depths shown on plans or to lower depths, if necessary, for removal of sod or other unsuitable materials. If called for on plans, subgrade shall be crowned for drainage.

Preparation of subgrade: Subgrade shall be compacted at approximately the optimum moisture content by tamping rollers on a three-wheel ten-ton roller. If necessary to obtain desired compaction, water shall be added to the subgrade. Subgrade material containing excess water shall be allowed to dry to proper consistency before compaction.

Compaction of clay fill: Clay fill shall be placed in layers not greater than 8-in. thickness, loose, and compacted by tamping rollers or ten-ton, three-wheel rollers to at least 90 percent of maximum density as determined by the following laboratory test in the standard Proctor cylinder 4-in. diameter having a volume of 1/30 cu. ft.; the cylinder shall be filled in three equal layers, each compacted by 25 blows from a 2-in. diameter tamper, weighing 5½ lb., dropped from a height of 1 ft. Compaction in the field shall be determined as follows: approximately 15 lb. of material shall be taken with a post hole auger and weighed, and the moisture content determined at once; the hole shall then be filled with dry sand of known weight and the volume compiled; the dry weight and percent of compaction shall be determined by the formulas:

$$\text{Dry weight per cu. ft.} = \frac{\text{Wet weight per cu. ft.} \times 100}{100 + \text{moisture content}}$$

$$\text{Percent compaction} = \frac{\text{Dry weight per cu, ft.} \times 100}{\text{Max. dry weight from lab. curve}}$$

Compaction of rock fill: Rock shall be placed in layers and compacted to a dense and stable condition by a ten-ton, three-wheel roller. Each compacted layer shall not be more than 5 in. The surface of the rock fill shall be leveled up with limestone screenings or crushed rock 1-in. maximum size, rolled to a smooth surface suitable for placing of concrete. Unless the total rock thickness is shown on the plans, it shall be 10 in., and the compacted clay fill, if required, shall be brought up to within 10 in. of bottom of concrete slab.

Construction

As can be surmised from the above specifications, construction of the foundation is extremely simple. Topsoil is removed by bulldozers or, in the case of large buildings, by carrying scrapers. After the subgrade is compacted trucks dump the clay fill in place, which is spread by bulldozers and compacted by rollers. This process is repeated for rock fill.

Placing of concrete is equally simple. Transit mixers back into the floor area and deposit the concrete practically in place, including that for the sills and column pedestals. Forms for the sills and pedestals are supported on stakes driven into the subgrade.

Time-Saving Aids In Writing Federal Building Specifications

TO MEET THE DEMAND for short and uniform specifications for government building construction, and in an attempt to reduce the time and labor now consumed in their preparation, a representative committee of federal agencies has made a study of current specification-writing routine. In its report, which is being published in the Building Materials and Structures series as BMS87, this committee advocates a directive method which, under proper supervision, should condense specifications, bring about economies, and increase efficiency.

Fundamental principles that have proved of value over a period of years have been retained and are coordinated in a basic specification that promotes uniformity and permits choice of those materials and methods of construction best suited to the specific project in hand. Application of the method is made clear by three examples: A model basic specification illustrating the procedure outlined, a typical contemporary specification, and the typical specification rewritten in accordance with the method advocated.

Copies of BMS87 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10c. each.

Window Design Saves Critical Materials

Samuel Koffsky
Chief Engineer, Simmons Machine Tool Corp.
Albany, N. Y.

CONSIDERABLE ECONOMY in critical building materials, such as steel and putty, may be effected in window construction by the simple expedient of eliminating alternate vertical members and using a double-width glass light, 28¾x20 in., in place of the generally accepted 14x20-in. size. In the design of a large machine shop and warehouse involving over 18,000 sq.ft. of steel sash a special study was made by the writer to determine the amount of this saving. As a result, the widened glass light construction was employed and two years of use have proved the larger glass light practical and effective. No change was necessary in the steel sash manufacturing technique, since the same jigs were utilized for spacing the steel members.

Comparative figures on typical window opening 58¾ in. by 102¾ in. are listed in the accompanying table. In the standard steel sash, made up of twenty 14x20-in. lights, approximately 99 lb. of steel and 117 lin.ft. of putty are required. In using the ten 28⅜x20-in. lights for the same size opening, the weight of the steel necessary is reduced to 82 lb. and only 83 lin.ft. of putty are required. Thus, the revised design shows a saving of 17 percent in steel and 29 percent in putty. Labor costs for installing the glass and putty are reduced by about 25 percent, and a substantial saving in labor costs for painting the completed sash also results.

In addition to the material saving, the new layout improves the general appearance in most installations, due to the predominance of the horizontal lines in the sash. The larger glass openings also admit more light and reduce by 50 percent the number of glass lights to be cleaned periodically.

The one disadvantage of the larger glass size is the cost of replacement, and where the percentage of breakage is high, this fact should be carefully weighed. The first cost of the large glass is slightly higher because of the larger area required. There is also the restriction on the larger size that the layout must be kept in units of double widths.

In a complete installation the steel economy indicated will be reduced somewhat, depending on the proportion of ventilating sash and the number of mullions employed to connect adjacent sash frames. For the building shown in the picture the actual contract price for the steel sash, including mullions, was 15 percent less for the revised design than for the standard.

Comparison of two designs for window openings 58⅜ x 102¾ in.

	*A**	*B**	*Numerical Difference*	*Difference in Percent*
Steel, lb. . . .	98.8	81.7	—17.1	—17
Glass, sq.ft. .	38.9	39.8	+0.9	+2
Putty, lin.ft. .	117.0	82.8	—34.2	—29

* A is for twenty 14x20-in. lights and B is with ten 28⅜x20-in. lights.

SIMMONS
MACHINE TOOL CORP.

Fred Wittner photo

Cost of the windows for this machine shop was reduced 15 percent by using double-size panes. Although large panes cost slightly more, appreciable savings occur in steel und putty. Appearance of building is considered improved by the predominance of horizontal lines.

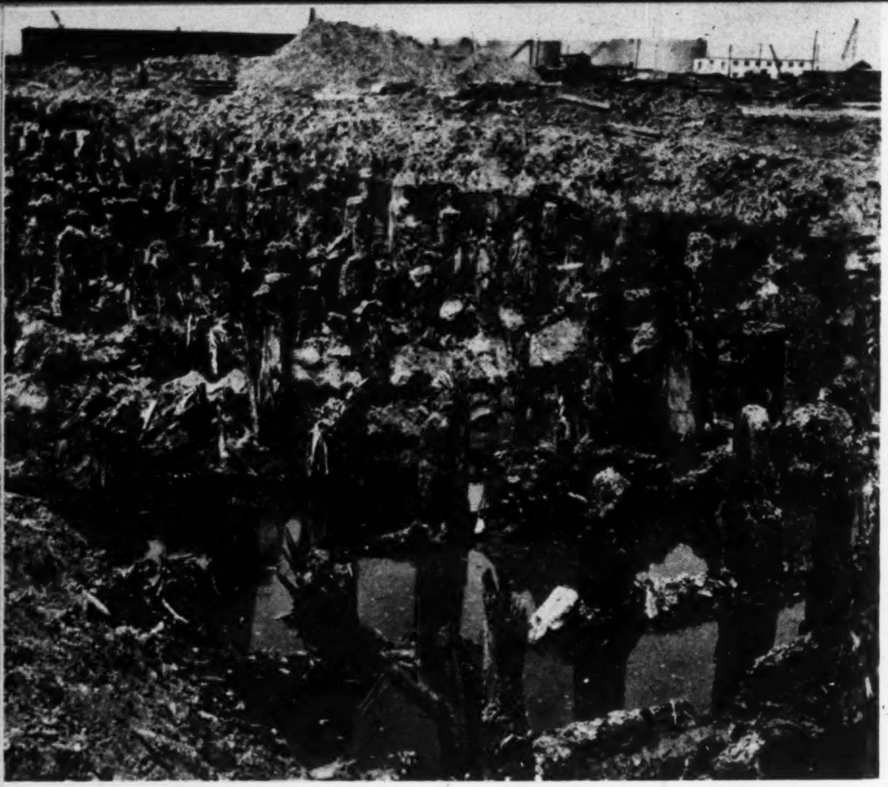


Fig. 1. Typical of the rotted present condition of pile tops driven in a shipyard during World War I. Below water level the piles are sound and strong.

Pile Foundations Salvaged for Shipyard

Contents in Brief—*Salvage in place of wood piles driven for World War I shipbuilding speeds start of naval shipbuilding in a new yard. All timbers above the level where they have been continually wet are rotted but below this level the old ways, and the adjacent fitting-out pier, are salvaged to provide new facilities quickly.*

A LARGE NUMBER of the 25,000 piles driven for a boat construction yard during World War I days have been salvaged in their original position and used to speed the construction of a new shipyard. After more than 20 years of idleness the old yard presented a dismal appearance, with exposed timbers so rotted that they were dangerous to walk on. But where the wood had been continually wet the condition of the substructure was entirely different. Piles, driven 60 ft. to a hardpan, were found to be just as solid as ever with their load-carrying capacity still at full value.

The original yard consisted of 23 end launching ways with space between for operation of equipment. At the head of the ways ample room was available for storage of materials and farther back were located the usual buildings for fabrication of parts. A long fitting-out pier was part of the original yard. It was built to accommodate ships on either side with a section along a land area where berths were provided on only one side. The entire yard and pier are being rehabilitated very much along the plan of the original design.

Rehabilitation of the ways

The ways of the old yard were about 36 ft. wide and 80 ft. center to center. The supporting structure consisted of timber pile bents (nine piles to a bent) at 5 ft. c. to c. extending to the height required for the sloping deck of the way. Outshore from a timber bulkhead line additional piles were driven to support launching ways to carry the ships into deep water.

Most of the timber work above ground on the old ways had disappeared, but sound piling remained beneath the ground. The launching ways, mostly under water, remained in good condition and new shipways have been built over the old to take advantage of the existing piling. At the landward end of the ways an assembly yard will be located with large cranes operating parallel to the shore, while further inshore will be machine and fabricating shops that will prepare material for the ships.

The ships to be built require wider ways than those formerly used but judicious planning of the assembly methods evolved a scheme of using a traveling gantry crane on one side of each way with a crawler crane opposite, thus requiring less room between the ways than was formerly provided. Either machine can be used on either of the adjacent ways as required. Roadways for trucking are provided under the gantry as well as along the crawler crane runway.

Backhoes for excavation

The area where the shipways are located is a tidal flat with the surface material, a soft muck, only 3 or 4 ft. above high-tide level. Since existing piles were rotted and unsound to a point well below the ground the area had to be excavated about 4 to 5 ft. Pile bents, at 5 ft. c. to c., rising through this material, made excavation difficult but it was completed rapidly with backhoe attachments on standard shovel-crane rigs. The backhoe was spotted in front of the area to be dug out and traveled at right angles to the pile bents as the machine cleaned between the rows of piles. All excavated material was loaded directly on trucks for haul to a waste bank.

The elevation of the lowest rotted piles in any area determined a cutoff grade, in most cases only a little below high-tide level, and thus no cofferdam was required. Ribbon strips of 1x3-in. board were nailed along each side of the row of piles in a bent and the pile tops sawed to this line by hand. Hand sawing was found most economical as the added cost of compressor operation, including a hoisting engineer as operator, did not justify the use of pneumatic-powered saws. Gasoline-powered saws were not found sufficiently faster than hand work to justify the investment for the 50 or so pieces of equipment necessary to provide the speed required.

Bench-caps and plumb-posts

After removing the rotted pile tops each individual bent of piling was capped with a 12x12-in. timber, drift-bolted into the piles. On the cap, and directly above each pile, a 12x12-in. plumb-post was set to extend the bent to the required height for the new work. The plumb-posts were toe-spiked to the bench-cap and braced with diagonal pieces to resist transverse movement.

Most of the large timbers required for the work were cut to length on a large circular saw set up near the rail delivery point where all timbers came to the job. A hand-operated chain hoist on a job-made trolley delivered the timbers to a set of conveyor rolls that permitted easy movement of the material to the saw. Timbers needed for a particular location were ordered in groups and cut in combinations from the length piece giving the least waste. Cut pieces, marked with their length and the location for which they were ordered, then were hauled out in truck loads. Use of the power saw speeded the job considerably and eliminated much timber waste.

While the rebuilding of timber work was in progress steam cranes rigged with rigid, but adjustable, leads were used to drive a single row of piles at each end of each bent of the original shipway to widen the ways as required. These piles were sufficiently long to extend to the full desired height of the new shipways. The 12x12-in. cap to carry the deck of the new ways extends the full 50-ft. width of the revised pier, thus incorporating the newly driven piles in the bent. Use of piles in sufficient length to extend to the full height of the new cap saved excavation, shortened the length of the bench-cap, eliminated the plumb-posting and stiffened the structure.

Launching a ship from ways requires sufficient slope to overcome the sliding friction of the great load carried on wood cradles. Here the shipways are on a slope of ¾ in. per foot of length toward the water end, provided by making successive bents of piling higher and cutting the top of the cap to the required slope. The cutting was done by adzing the cap to an accurately established line marked by a 1x3-in. ribbon strip tacked to the timber. The shipway deck is made of 4x10-in. timbers laid longitudinally and spiked to each cap with two 10-in. boat spikes driven through pre-bored holes.

Fitting-out pier rebuilt

Rehabilitation of the existing outfitting pier and dock, to which the partially finished vessels are taken for completion after they are launched, was also required. At the time new construction started the old pier was so rotted that it was impossible to walk over it, yet at the level where the timbers have always been wet it was in first-class condition.

Rehabilitation procedure included removal of the old deck, stringers and caps, and cutting the piles off about 2½ ft. above low tide. The pile bents were then bench-capped and plumb-posts set on the caps directly over each pile to bring the pier to the desired elevation. The revamped (and the original) pier is 57 ft. wide out to out and rests on bents of 16 piles each, spaced 6 ft. apart. New batter piles and fender piles were added at each end of each bent to stiffen and protect the structure. A 40-ft. gage track for a heavy gantry crane is car-

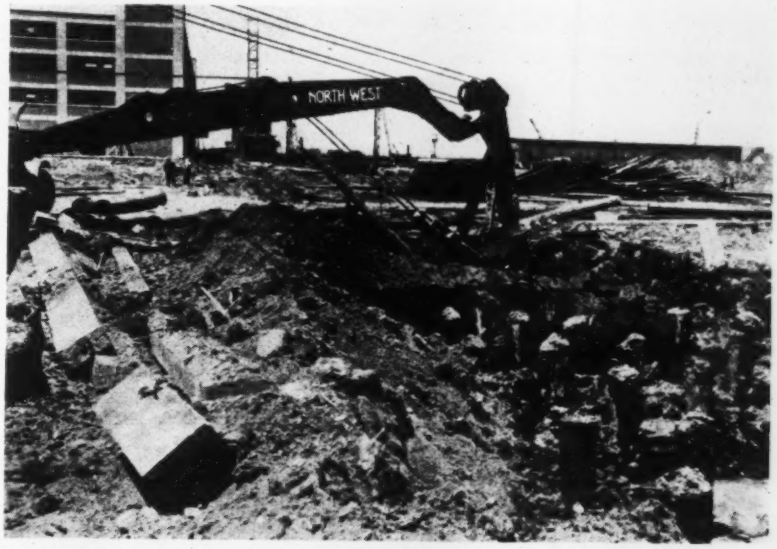


Fig. 2. Excavation between the old pile bents was completed rapidly with backhoe attachments on standard shovel-crane rigs.

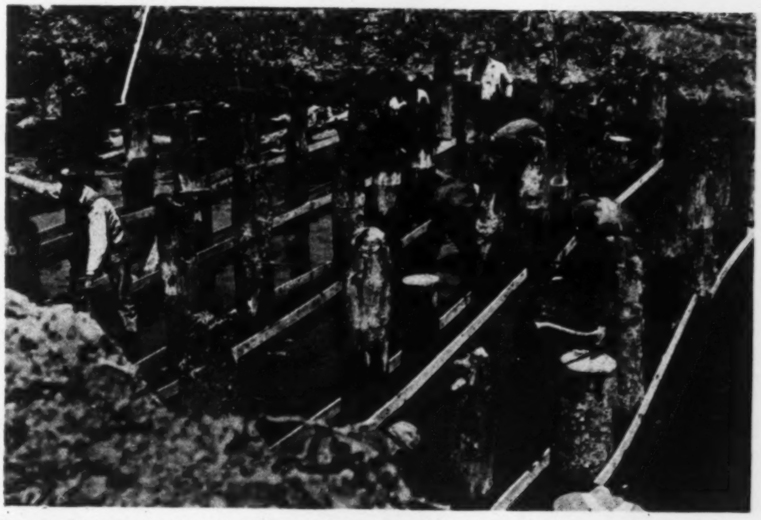


Fig. 3. The elevation of solid wood in the piles is established and all piles are hand-cut to that level. Bench-caps and plumb-posts, the latter set directly over the old piles, are used to replace the rotted sections.

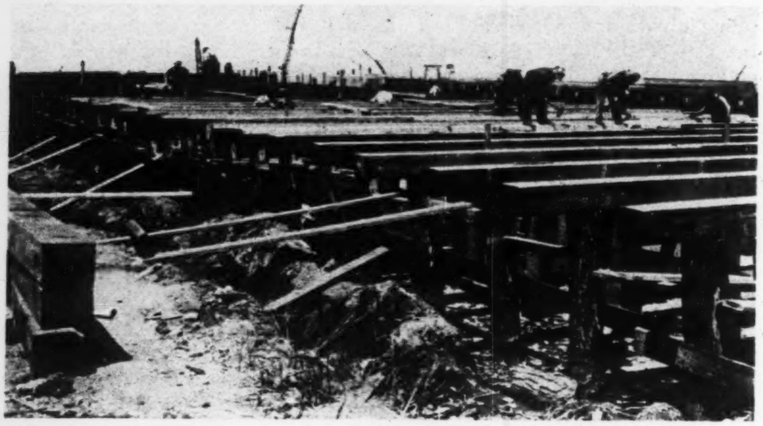


Fig. 4. A row of new piles extends each bent to the required present width. Caps are cut with an adz to accommodate the ¼-in. per foot slope of the decking.

ried on the deck, with the space between the legs of the frane utilized for two railroad tracks and a trucking roadway.

A short bent of three piles is used between each of the full width bents as added support under each rail for the gantry-crane. When tests were made on the original piles in the short bents they would not sustain loads, and investigation disclosed that the piles were some 20 ft. shorter than those in the main bents. Deepening of the adjacent channel, after the piles were driven, had reduced their bearing capacity below present requirements and the piles were withdrawn and longer ones driven to extend to hardpan, and to the required cutoff height without posting. The pulled piles were in good condition and were redriven to support utility lines around the yard.

The new piles (in the less than 5-ft. space between the existing bents) were driven with an outrigger attached to one of the usual type of fixed vertical lead floating drivers. The outrigger held a set of fixed position leads 12 ft. in front of the regular leads and carried a double-acting steam hammer on a line over the top sheave of the regular leads and then over a sheave at the top of the outrigger. The bottom of the outrigger frame was built to clear the adjacent bents of the piling at low tide.

The new bent of three piles and the plumb-posts on the old bents are each capped with a 12x12-in. timber over which stringers are laid longitudinally to distribute the load. The track for the gantry-crane is carried directly on the stringers and thus well below the deck. Floorbeams are laid across the stringers with three timbers set as ties between the beams for added support under the railroad tracks. Deck timbers are 6x10 in., Merchantable grade long-leaf yellow pine spaced uniformly with ½ in. between them for drainage and are fastened to the deck with a 10-in. long boat-spike. The rails for the tracks are set directly on the floorbeams and ties, making their top almost flush with the deck.

Pneumatic hammer drives spikes

Spikes in the decking are driven in pre-bored holes with a pneumatic hammer. Where spikes are close together the hammer will drive them flush with the wood on a 5-sec. cycle per spike. Rapid driving to flush with the timbers is made possible by the job-made driving head or set used on the hammer. The driving piece is a bullpoint with the end upset into a flat but roughened surface. It is held on the spike by a reducing pipe-coupling with the small end just large enough to slide over the shank of the bit but too small to slide off over the upset head. When the hammer is set on the spike the coupling drops low enough to hold the head in place but when it reaches the deck the coupling slips up the shank permitting the spike to be driven flush with the wood.

The plant is being built for the U. S. Navy under supervision of Capt. J. M. Irish, assisted by Lieut. A. P. Parker in direct charge of the work. General design of the yard and construction of ships in the completed plant are the responsibility of the Federal Shipbuilding and Drydock Co. Layout of the plant, to provide the best facilities for shipbuilding, and general supervision of all construction have been the job of W. C. Ohlssen, plant engineer, assisted by A. Hershel.

Walter Kidde Constructors, Inc., of New York head a group of specialist firms combined under one management to build the yard. Kidde does the design for all of the work and the general construction of buildings, etc. under the direction of project manager Fred Rabbe. The foundation and marine construction, including the shipways and piers described, is handled by Linde-Griffith Const. Co. of Newark, N. J., for whom N. P. Ahrens is in charge as marine superintendent on the project.

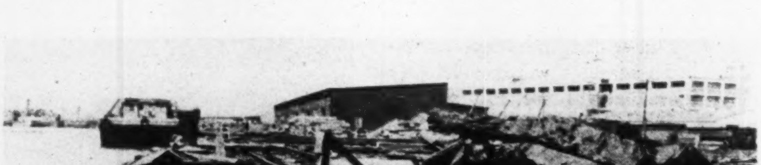


Fig. 5. Condition of the old fitting-out pier. This particular section was damaged by fire and bench-capped and plumb-posted years ago .

Wrecking of Old Concrete Building Provides Interesting Data

When a four-story reinforced-concrete building of 1910 vintage was recently demolished at the Puget Sound Navy Yard to make way for the erection of new facilities, opportunity was afforded for a number of interesting observations: the tenacity with which the frame resisted collapse under the pounding of steel ball skill crackers swinging from dragline booms; the poor concrete and faulty design when measured by modern standards; the effectiveness of spiral reinforcing in the columns; and the use of combination tension and web reinforcing in the beams. The methods used to demolish the building and reclaim the steel for scrap are also worth noting.

Demolition methods

The building, laid out in two connecting wings, had concrete walls, and its framing was of conventional beam and girder type, with columns arranged in 18-ft. square bays. Two dragline cranes on which steel lead-filled ball skullcrackers were substituted for the buckets comprised the demolition equipment. One skullcracker weighed 5,000 lb. and was used principally for battering down the columns and girders and for pounding the piles of debris to break the concrete loose from the reinforcing steel. The smaller skullcracker, weighing 1,600 lb., was useful in demolishing the walls and was utilized to break up the first floor after the remainder the building was down. For this latter operation it was interesting to note how much more effectively the skullcracker worked if the dust was first swept off the floor; only about half as many blows were required when this shock-absorbing cushion of dust was not present.

Early attempts to "crash" the building by breaking the columns in the first story proved unsuccessful, and thereafter demolition was carried out progressively from the roof downward. As sections of the building were broken loose, the skullcrackers hammered them until the steel was separated from the concrete. Then as piles of debris accumulated, the skullcracker was replaced with a special rake consisting of a V-shaped hook, which was dragged through the broken concrete to remove the reinforcing steel. Between 80 and 90 percent of the steel reinforcing was salvaged for scrap.

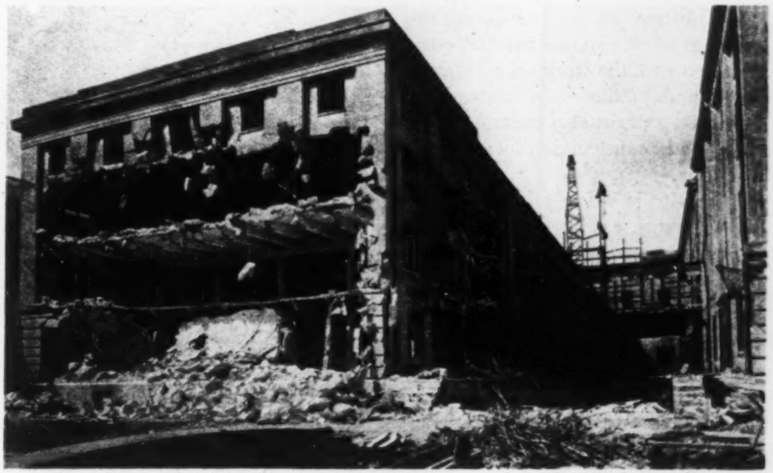
Poor concrete and obsolete design

The demolition work revealed that the quality of the concrete ranged from mediocre to very poor. It was made with small-sized aggregate, much of it no larger than pea gravel, and there appeared to have been none too much cement used. Design and disposition of the reinforcing steel was also faulty, as measured by modern standards. For example, vertical column bars were broken at the floor levels, and a pipe sleeve set in the floor slab served as the only splice; adjacent bar ends did not lap but merely abutted within this sleeve. This detail, of course, made it relatively easy for the skullcrackers to break off the columns at the various levels. Freeing the column, however, was not so easy because of the presence of spirals, which confined the core concrete very effectively. So well were the spirals embedded that very little of this steel could be salvaged economically.

In the beams and girders, reinforcing was frequently very close to the bottom. Part of this reinforcing in the beams was of an old patented type whose section resembled a T with the stem projecting upward. At intervals sections of the flange had been cut free of the web and bent up at an angle to act as stirrup and web reinforcement; these cut sections occurred alternately on either side of the stem. This special reinforcement was of smooth steel, and the thickness was about $\frac{1}{8}$ in. A considerable part of its section occupied the position of tension reinforcement, but deformed bars were also used in the bottoms of the beams, one laid either side of the stem of the T. Surprisingly enough, these deformed bars were stopped short of the support, while short lengths of similar deformed bars were placed in the tops of the beams to provide continuity at these points.

Despite these faults in design, and despite the poor quality of the concrete and the ineffectual bonding of the steel as revealed by the demolition, the building frame exhibited a remarkable rigidity. Even after supporting columns and walls had been removed from two sides of a bay, the floor system remained cantilevered, with very little sag. These cantilevers, furthermore, had to be battered down, piece by piece. In short, with the amount of inherent resistance to collapse observed in this building, there was much encouragement for expecting highly creditable performance from modern reinforced-concrete structures that may be subjected to shock sufficient to carry away parts of the framing.

The demolition was carried out for the Puget Sound Navy Yard under the direction of the Public Works Officer, Commander Cushing Phillips (CEC) USN, by the J. W. Bailey Const. Co., Seattle, Wash.



Official U. S. Navy Photograph

Severe and sustained battering with skull crackers was required to wreck this 30-year-old concrete building despite its poor design and construction as measured by current standards.

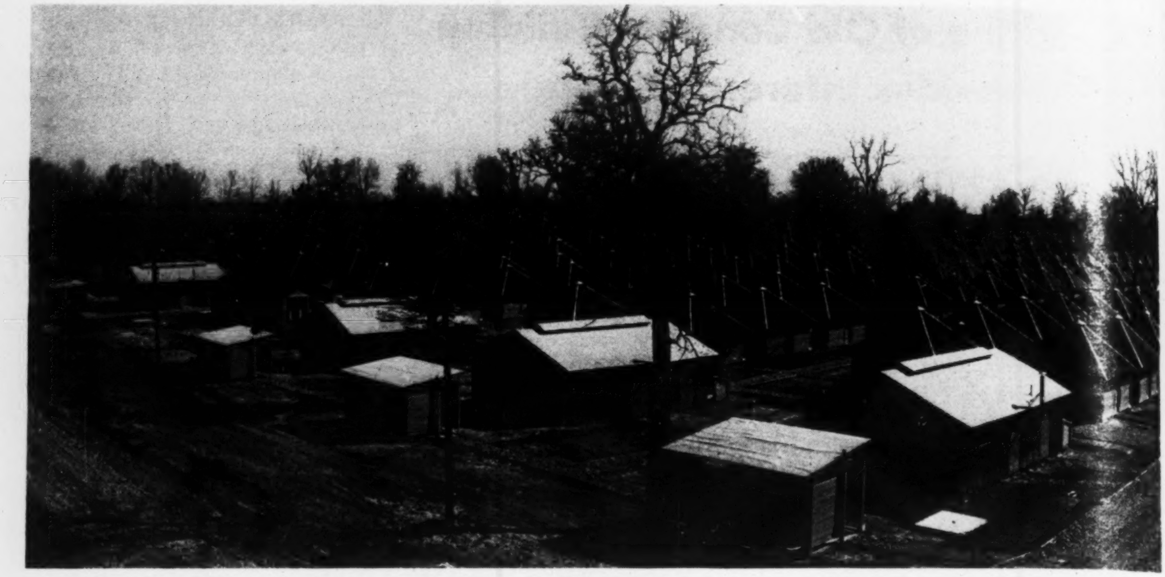


Fig. 1. One corner of camp with latrines in immediate foreground, next are bathhouses, and beyond five-man "hutments."

Alien Camp Built in 23 Days

Contents in Brief—*With the building operations started five days after receiving instructions that the job should be carried out, the Nashville District, U. S. Engineers has completed an alien concentration camp in 23 days. Most of the buildings are wood-frame, 5-man "hutments," but a large number of 15-man, wood-frame barracks was required. Construction of mess halls, latrines, bathhouses and streets are also described.*

CONSTRUCTION of an alien concentration camp for 3,000 persons in 23 days is a recent accomplishment of the Nashville District, U.S. Engineer Department, well illustrating that the war construction program is really in high gear. Receiving instructions to proceed with the work on a Thursday, by Sunday those in charge had awarded a negotiated contract for the job and construction was started Monday.

The site is a fairly level field free of buildings, except for about fifteen wood-frame structures that have been made a part of the camp. New work included construction of 475 five-man "hutments", 43 fifteen-man barracks, 10 bathhouses, 10 latrines, 7 mess halls of 160-man capacity, 2 miles of 11-ft. high barbed wire fence, 2,800 ft. of cast-iron water mains, 1,400 of clay tile sewers, and several guard towers.

Later, under terms of a supplemental contract, a 100-bed hospital was built adjoining the site at the east end.

Construction started at the west end of the camp and progressed to the east. Little grading was required and only a 50-hp. bulldozer, two patrol graders, and one 8-cu.yd. carrying scraper, plus the necessary tractors, were required for this work. In a very short time the contractor was placing the necessary concrete foundations and footings for the many different buildings, this operation being done with five two-bag mixers and

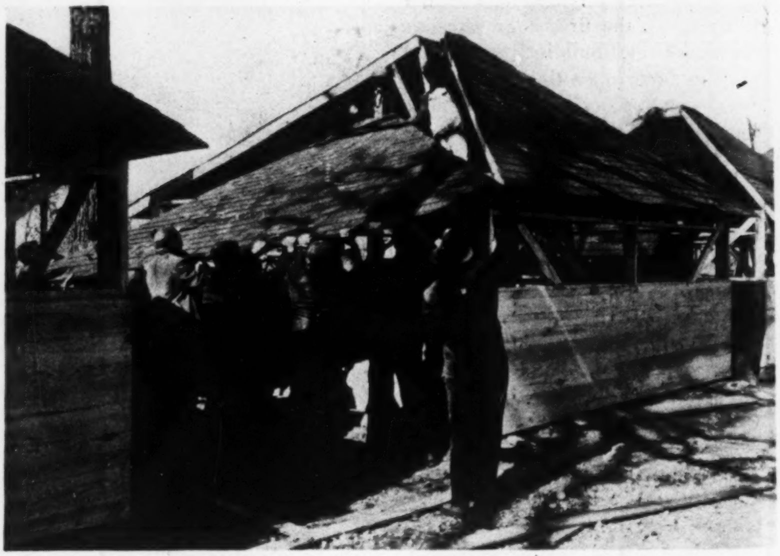


Fig. 2. Twelve men in one hour erected a prefabricated five-man "hutment".

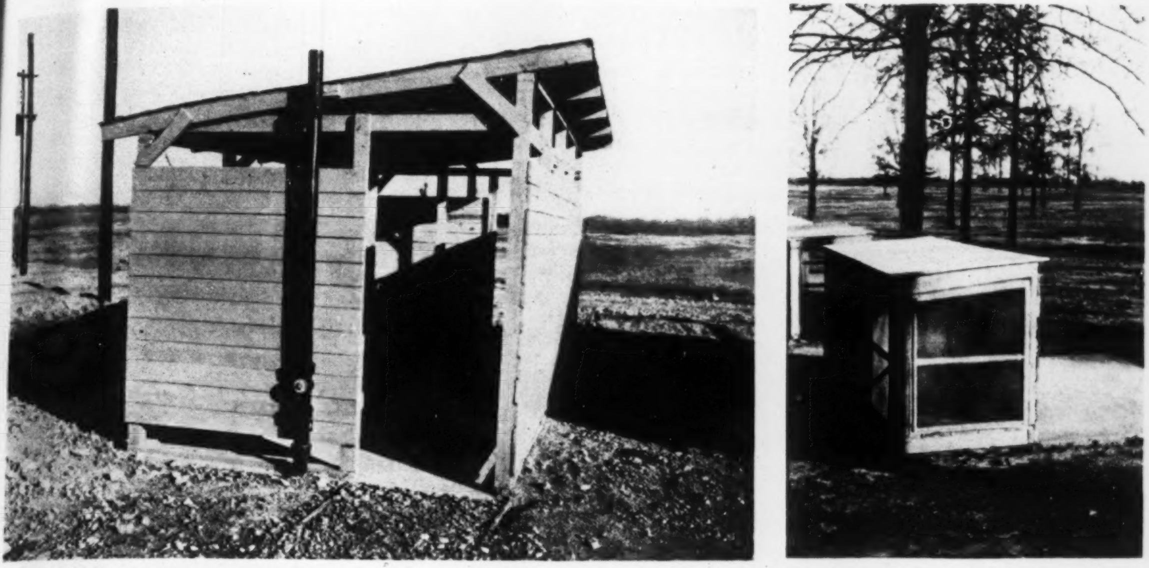


Fig. 3. A typical 8x16-ft. latrine (Above), which is equipped with eight toilet stools and two 4-ft. long urinals. Roof of this structure is 1x6-in. sheathing covered by rolled roofing paper, while the walls are 1x6-in. sheathing. Screened cages built on a concrete slab are provided to avoid fly nuisance from garbage cans (Right).

about ten trucks for delivery of the necessary materials.

Prefabrication of hutments

While the floors were being constructed, the lumber for all the buildings was pre-cut at a central sawmill. The five-man structures were pre-assembled but the other buildings were built in place. The small "hutments" measure 16x16 ft. and the sidewalls are 1x6-in. wood sheathing broken at the top by a continuous band of windows covered by screening. The roof is 1x6-in. sheathing covered by 210-lb. asphaltic strip shingles. In preassembly of these buildings each wall was prefabricated as one unit and the roof was made up as four sections complete with shingles.

Once erection started, a twelve-man crew was able to erect a five-man unit every hour, and fifteen men in eight hours were able to construct one of the larger barracks.

The accompanying photographs show typical buildings and methods of construction.

The roads are 20 ft. wide. They are paved with a 6-in. thickness of traffic-bound crushed stone of 2-in. maximum size. The sidewalks are of similar construction and 3½ ft. wide and 4 in. thick.

Wire fences surround site

For double protection parallel fences completely surround the camp. These fences are 6 ft. apart and each fence is 11 ft. high and consists of barbed wire strands on 6-in. centers and cedar poles on a 10-ft. spacing. Similar single fences are employed to divide the camp into three roughly equal areas. Gates permit passage from one area to the other.

Two eight-hour shifts were employed with the contractor's force totaling 600 men. Final cost of the camp was $378,000. For the project, Marr & Holman, Nashville, Tenn., with James L. Howard in charge, were architect-engineers; Rock City Construction Co., and Volz Construction Co., Jack Lee, III, superintendent, were the general contractors for the project.

For the U. S. Army Col. O. E. Walsh is district engineer at Nashville and V. M. Cone is in charge of the engineering division. At the camp site Capt. John H. McGovock was area engineer for the first stages of the work and Capt. George H. Graham for the last part. T. D. Irvine was resident engineer.

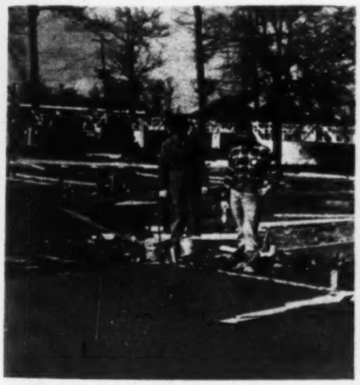


Fig. 4. Construction of plain concrete foundations and floors started two days after contractor moved on the site.

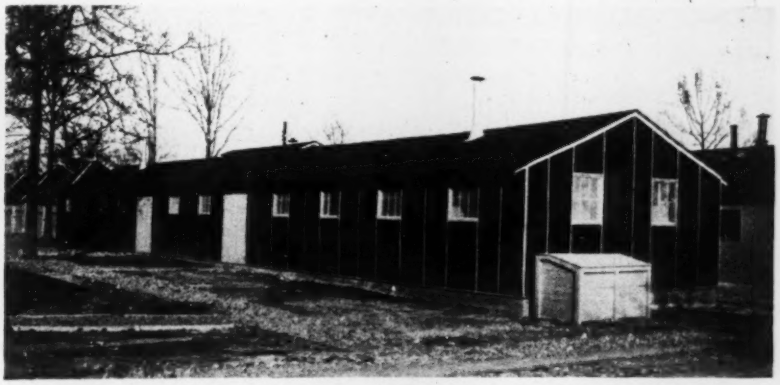


Fig. 5. One of the seven 20x100-ft., wood-frame 160-man mess halls required. Walls are 1x6-in. sheathing covered by 15-lb. felt lapped 3 in., and the roof is similar sheathing covered by 210-lb. asphaltic strip shingles.

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Truck-mounted mixers are being increasingly used for all types of engineering construction.

More Production From Truck Mixers

Hal. W. Hunt

Assistant Editor Engineering News-Record

Contents in Brief—*Transfer-hoppers, big buckets and better coordination of activities are suggested to speed unloading of trucks and thus gain more production from transit mixers. Elaborate plants for rapid batching are desirable but small bins can be satisfactory; mixing water should be batched with the aggregates; wash water should be dumped; cleaning must be thorough to secure efficiency in mixing and discharging.*

TRUCK-MOUNTED CONCRETE MIXERS may become scarcer and even harder to get so that it is essential to make the most of those that are available. Suggestions from manufacturers, distributors and commercial operators on how to place more concrete by truck mixers are condensed here as an aid in this direction.

Obviously, one way to get more out of a truck mixer is to shorten the time cycle per batch. The average truck-mounted mixer, operating commercially, delivers about 30 cu.yd. of concrete per day! Compared with averages of 40-60 cu.yd. per hour for a paver, this production is woefully low. Recently, however, construction of unprecedentedly large and sprawling manufacturing and munitions plants in the open country has made a new field for truck-mixer operation, which heretofore has been restricted to city use. The move to the country has given the mixers an opportunity to show their possibilities, unhampered by traffic and other city-bred restrictions. Four, and even more, trips per hour per truck-mixer unit have boosted the average daily output to several times that on usual commercial delivery.

Speeding the release of the machines at the job probably offers the greatest opportunity for increasing the daily yardage placed with a single machine. This can be accomplished by closer coordination of plant and field operations and, so far as possible, by discharging all the concrete from the mixer at one time as soon as it reaches the work.

By controlling the time that the concrete is mixed and by discharging each batch completely at one time, the uniformity and quality of the final product can be maintained. Discharge time can be reduced considerably by use of large-capacity concrete buckets and transfer or tower hoppers that will hold the entire batch and can be used to fill buckets, barrows or concrete buggies.

Big buckets are available in special designs intended to go under the discharge of the truck mixer. The flared bucket, built up from a conventional type, and the "lay-down" type bucket are examples of what are available.

Also in use for filling large buckets under truck mixers are job-built movable timber ramps that increase the discharge height and permit use of taller buckets. Where a considerable quantity of concrete is to be used at one point, a timber-lined pit may be employed to guide a large bucket rapidly into a loading point sufficiently below ground level to provide headroom over large buckets.

For use where concrete is to be taken away from the truck mixers in buggies or wheelbarrows, several portable hoppers, designed to take two or more batches of concrete at full discharge speed of the mixer and deliver it through small gates into the distributing units, are on the market. Such hoppers smooth out the flow of the concrete and reduce spillage and waste, since it is much easier to fill a 10-yd. hopper than a wheelbarrow.

Careful scheduling of the concrete by effective contact between plant and field will make it possible to reduce the number of truck mixers standing idle on a job, and yet always have concrete ready for the placing crew. Greater difficulty in scheduling will be experienced with concrete purchased from a commercial plant than will be found in a job set-up. The usual tendency in ordering from a commercial plant for a particular day or job is to ask for the concrete earlier than the job will be ready for it, and at a delivery rate faster than it can be used, just to be sure the concrete will be there when it is wanted.

The best suggestion here is to be entirely honest with the supplier on starting time and requirements; give him a "break" every time it is possible and arrange the job to accommodate delivery. When the commercial supplier knows that he can expect the job to use the trucks asked for without delay, he will do everything possible to meet that schedule. If the commercial plant is asked for more truck mixers day after day than are used and released promptly, or if concrete is ordered earlier than the job is ready for it, the dispatcher has no alternative except to make his own guess as to when, and how fast, concrete should be sent.

Truck mixers manufactured prior to 1940 were nearly all of the horizontal-drum type, charged through a hatch in the top and discharged through a door at the rear. These units were built in 1½, 2½, 3½, 4 and 5-cu.yd. capacity for mixing, with a somewhat larger rated capacity for use as an agitator. During 1940 the manufacturers of the drum-type truck mixers revised their designs to make the standard 2, 3, 4, 5 and 5.5-cu.yd. capacity. Some larger sizes—to 8 cu.yd.—have been built for special service.

The 1940 sizes hold also for the high-discharge inclined-drum truck mixers, which can be charged either through a hopper at the rear or through a hatch in the top of the drum. All drum-type mixers continue to discharge through an opening at the rear. A "paddle type" of truck mixer is available in 2-cu.yd. nominal capacity. It is driven by power takeoff from the truck engine and is designed to do much of its mixing while loading, with a slow agitator action used to prevent segregation while in transit.

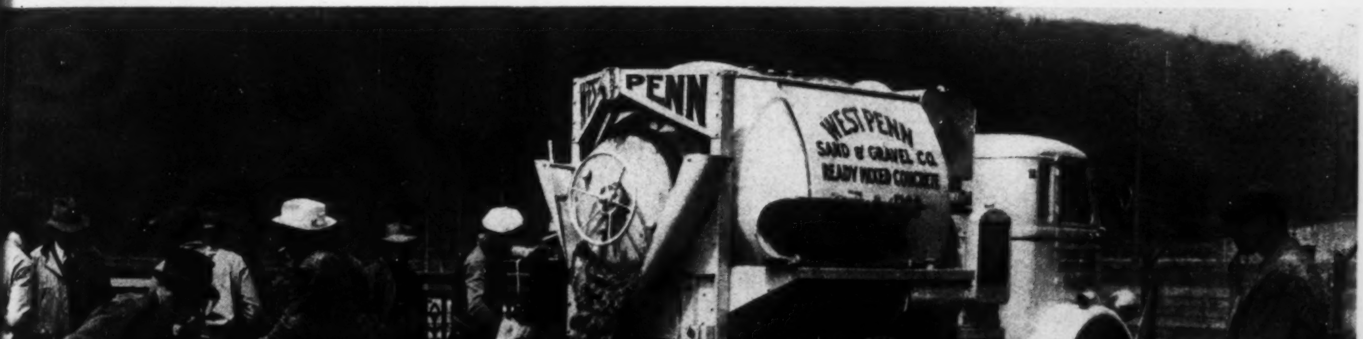
Separate engine or power takeoff

The drum-type mixers are available in all sizes with separate engine-driven units or operated by power takeoff from the truck engine. The former cost more initially, and operation costs are somewhat higher, but they are generally preferred as giving more flexible and speedier operation. In the relatively few areas where specifications do not permit mixing until the mixer is on the job, the truck power takeoff unit approaches more nearly the efficiency of the separate-engine type. Where mixing in transit is done, starting and stopping of the mixer drum and load, in addition to the truck, puts a very heavy strain on even the most powerful truck engine and transmission. This is especially true in traffic-congested areas where lights or cross traffic require frequent stops.

The high-discharge mixer costs only about 3 percent more than the horizontal-drum mixers and is becoming increasingly popular with the construction industry. Some engineers feel that the horizontal-drum mixer gives a more uniform concrete and for that reason still prefer it. At present, individual preferences are not important because of the limits on available machines. There is immediate work for any machine in good operating condition and it is probable that the local equipment distributors can direct any idle machines to a profitable job.

A variation in the mounting on a horizontal-drum-type mixer is use of a hoist that raises the entire mixer mounting higher than its normal discharge point. Such mounting requires a minimum of about 7-in. greater height to provide space for the hoist equipment and due to the higher center of gravity of the mixer and load, results in more side sway and wear on the rear tires. Especially competent drivers are necessary on such equipment since carelessness in unloading or in raising the hoist with wheels on one side a little lower or on soft ground can quickly cause trouble.

Truck mixers are capable of handling and rapidly discharging low-slump mixes. The drums must be kept clean inside, however, as the pickup blades are short and lose efficiency rapidly if concrete accumulates around them.



The best size of equipment for any job is a matter of local conditions plus availability. If hauling conditions are favorable, average construction jobs prefer about a 4-yd. mixer to the smaller ones, which require the same amount of labor for a comparable number of trips. Still larger units are less adaptable to changing conditions and cannot be as readily handled in bad going.

Batcher plant layout

An efficient and rapid-loading batch plant is essential for economical truck-mixer operation. The best plan is to have the plant arranged so that the truck mixers can drive through under the bins rather than back in. The bin space should be wide enough for easy maneuvering of trucks and the bin itself should be sufficiently high to accommodate any size or type of mixer which might be used without restriction to passage or vision. A loading funnel of flexible tubing can be supplied to reach low-mounted trucks without loss of material.

Large overhead bins are not ordinarily necessary if a speedy means is provided to elevate the material to the bins above the batchers. It is essential, that the supply of both aggregates and cement be adequate at all times for the maximum speed of construction.

Depressing the driveway to obtain adequate vertical clearance under the batching plant has been found an expensive expedient because the driveway fills up with water when it rains and trucks have difficulty in starting up the grade after they are loaded.

Batchers for truck-mixer loading should be large enough to measure the entire batch at one time and discharge it in one operation into the truck mixer. However, if two sizes of trucks are batched from one plant, it has sometimes been found expeditious to use one batch twice the size of the other, loading the larger in two "shots" from the same batcher.

Where speed in loading is essential, automatic controls for the cement and water batching are invaluable. The plant operator needs but to push a button for measurement of the cement, a second button for measurement of water, and then weigh out aggregates under manual control. When the proper amount of cement and water have been weighed, the measuring unit automatically cuts off. After all the material has been weighed out, it is a matter of seconds only for the operator to discharge the aggregate, cement and water into a mixer drum and to start the cycle over.

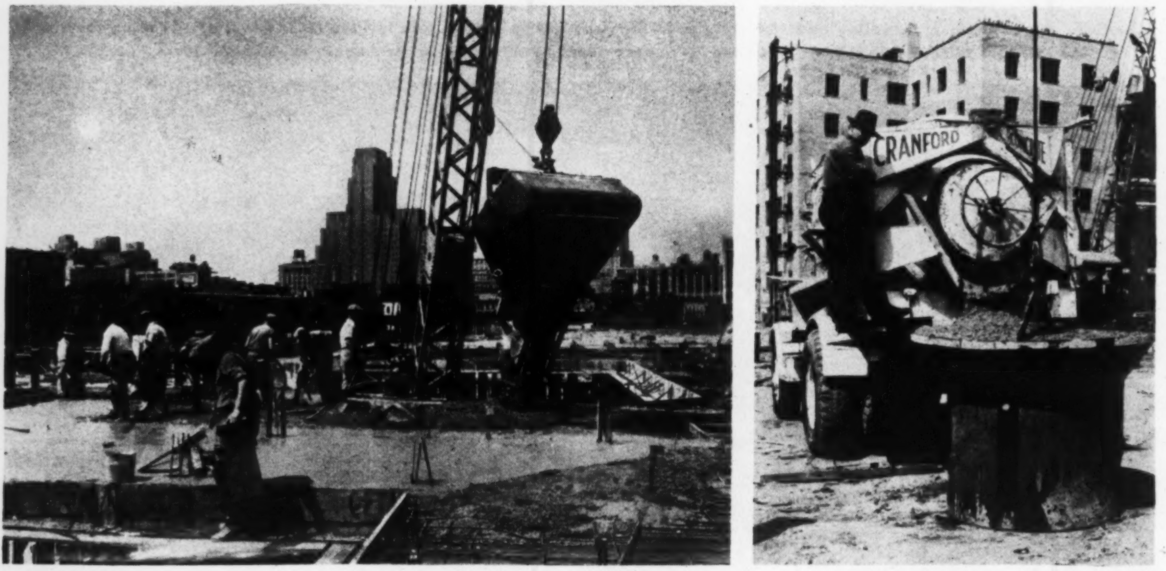
Every effort should be made in the design arrangement of loading plants to have it operated by one man. This can be accomplished by use of automatic devices where speed is essential or with manual equipment in a single plant if the hourly rates are not overly large. If all materials cannot be put through a single "one-shot" batcher, separate bins spaced far enough apart that a mixer unit can be spotted under each at the same time are satisfactory.

Perhaps a word of warning is in order regarding testing of the scales. Most truck-mixer batches are weighed out in large units—often ten tons and more, on a cumulative scale. These scales occasionally become inaccurate due to foreign material lodged in knife edges and other contact points with a resulting cumulative error over the entire range. To avoid poor concrete, misunderstanding and possible losses, it is suggested that a set of 50-lb. test weights be provided in each plant and that the scales be tested, at least weekly, for accuracy.

It is best to provide "ribbon-loading" for intermingling of the aggregates to get a maximum-size batch into the horizontal drums without the need of "rocking" the drum. The most satisfactory and compact scheme of loading can be found by experiment on individual plants and by varying the sequence of weighing materials into the batches.

Charge water into the drum

When conditions permit, it is desirable to weigh or measure the water accurately at the batch plant and introduce it directly into the drum along with the aggregate and cement. This process definitely expedites the operation of truck mixers and is essential for short hauls where the gravity feed employed on older mixing units might not get all the water into the drum in time to provide a uniform mix of the proper consistency. It has the further advantage of combining control of all the materials—and consequently the consistency of the con-



Flared bucket of 1½-cu. yd. capacity and a "lay-down" design for 2 cu. yd. of concrete permit employing big mixers without costly delays in waiting to discharge the full load.

crete—at the batcher plant where it can be watched by one person.

Charging water directly into the drum may be prohibited due to length of haul, or possible delayed use of batch, or by uncontrolled or erratic variations in moisture content of the aggregate. Accordingly, under many conditions the use of the water-measuring tank carried on the mixer is to be preferred, in order to permit of making necessary adjustments. That method of operation, however, introduces a number of additional human equations.

Mixing water can, of course, be measured at the batching plant and only the amount required for the batch charged into the mixer tank, thus using the tank only as a container, not as a measuring device.

40 to 60 revolutions

The National Ready Mixed Concrete Association specifies a minimum of 40 revolutions of the drums for proper mixing of concrete where the fine and coarse aggregates are charged simultaneously, or 60 revolutions where the fine and coarse aggregates are charged separately. Specifications of the American Society for Testing Materials and of the Joint Committee on Specifications for Concrete and Reinforced Concrete fix the minimum number of revolutions at 50. The maximum mixing permitted under any of the specifications is 150 revolutions. Cement and water may be charged separately without affecting the required revolutions for proper mixing. The count on revolutions should start after all materials, including water, are in the drum (revolution counters are available to facilitate a proper check).

The mixer should be operated at the speed recommended by the manufacturer. The NRMCA specifications require a minimum of 4 rpm. and a maximum of 225 ft. per min. peripheral velocity of the drum. Agitating speeds of 2 to 6 rpm. are specified by the NRMCA. On long hauls it is desirable not to start mixing until the job site is nearly reached. If discharge is delayed the mixer should be immediately slowed down to agitating speed to avoid over-mixing. For extremely long hauls it may be desirable to put the cement on top of the batch and not rotate the drum until the job site is reached. In this case the water should be carried in the mixer tank and not put into the drum until after mixing has started.

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Examples of what and what not to do. Use a portable hopper (top) into which the mixer can discharge its load quickly and be off. Do not permit a mixer to idle away time while wheelbarrow loads (below) are shuttled back and forth.

Truck mixers of the revolving-drum type commonly mix in one direction of rotation and discharge in the opposite direction, and are furnished with oil clutches specially designed for this severe reversing load. As mentioned above, it is desirable to discharge the entire batch of concrete at one time for better uniformity of the concrete, but this is just as desirable from the standpoint of wear on the machine since frequent stopping and starting to load wheelbarrows or similar small containers produce considerable wear on the machine, despite the special clutches.

Stop drum to control discharge

The discharge door on the mixer should never be manipulated to control the flow during discharge of the drum. This results in unnecessary wear on the door seat and is a definite cause of segregation and non-uniformity of the concrete.

Copious use of water and energy is required to keep a concrete mixer clean. There is no answer as to how often a mixer should be cleaned except that concrete should never be allowed to accumulate either inside or outside the drum. A dirty drum may close up lubrication fittings, hide a loose or broken part, and requires carrying more deadweight. The area of blades is much less in a truck mixer than in a conventional concrete mixer so that it is even more important to keep the blades free for full mixing action. A little concrete permitted to accumulate around the blade slows the discharge speed of the mixer considerably, particularly on the high-discharge type.

Different mixes, aggregates and cements quite often have entirely different clinging characteristics. It sometimes makes a difference which material first strikes the exposed interior of the drum as to how much of the cement may stick to the mixer rather than go out with the batch. Manufacturers recommend specific

Central batching of heated materials for rapid haul to point of placememnt has extended the scope of economic cold weather concreting.

sequences and they should be tried first, then varied experimentally to correct sticking of the particles. In some cases washing out may be required only at the time that a mixer is allowed to stand idle for several minutes, as at lunch time. Under other conditions it will be necessary to wash the drum after every batch, particularly on long hauls.

What to do about washwater

It is normally recommended that a flush tank of water be provided to supply washwater for use on the return trip. Disposition of this washwater is a particularly controversial point in truck-mixer operation today.

The following is quoted from a reply to a request for criticism of this article from a man long identified with transit-mixed concrete.

"Eliminating the use of washwater in mixing concrete should no longer be a matter of controversy. Its use is generally ruled out in modern truck-mixing practice. It is entirely prohibited by many engineers and concrete inspection authorities.

"This practice originated in early commercial concrete plants where disposal of washwater was a troublesome problem, due to lack of proper facilities. Plant operators attempted to justify its reuse as a 'saving' in operating time and in the use of mixing water.

"All modern ready-mix concrete plants are provided with suitable facilities for the disposal of washwater. There is no problem and little, if any, lost time in discharging it from the mixer, which takes only a few drum revolutions and a few seconds of time.

"Entirely aside from technical considerations, the chief objection to use of washwater for mixing purposes is lack of automatic means for controlling its use. Measuring and compensating for washwater left over from one batch, if used in the next batch, depends almost entirely upon manual control on the part of individual truck drivers, and is almost certain to result in irregularities in the control of mixing water.

"In general, water used for flushing the mixing drum consists at best of an extremely diluted and practically valueless cement slurry, more nearly like 'chalk water.' It usually contains a small residue of coarse aggregate. Often it includes cakes or lumps of partially hardened material loosened from the mixing blades in the washing process. This matter is foreign to good concrete. Lack of proper plant facilities for disposing of dirty washwater does not justify an attempt to 'save it' at the possible expense of concrete quality by making it part of each succeeding batch."

Commenting on the same subject a concrete technician wrote: "The use of washwater would never be detrimental, I would think, so long as its volume is accurately measured, and I see no particular difficulty in such measurement. The washwater tank is, on modern mixers, independent of the mixing-water tank and a reasonable amount of attention to detail and inspection can assure that the same amount of flushing water always goes into the mixer. However, where washwater is used only infrequently it should be discharged."

Special oil for the clutches

The one special thing about the lubrication of a truck mixer is that it should be done according to the charts furnished by the manufacturer. The clutches particularly require a special oil and failure to use only that recommended by the clutch makers has caused much expense. The mixer should be lubricated daily as this is the only way to keep the various contact parts and the screws for operation of loading and discharge openings free of cement and aggregate particles, thereby assuring satisfactory operation. At a time like this, when it is difficult to get replacement parts, it is more true than ever that lubrication is far less expensive than the cost and delays occasioned by lack of its use.

Experience has shown that it is better to have each operator responsible for one truck than being sent out on different units. The operator will naturally take greater interest in his own unit and try to keep it in better condition. He should be made

Truck mixers are especially adaptable for use on large or small building jobs because of their versatility. Concrete can be delivered rapidly to practically all points where needed.

responsible for seeing that lubrication is properly done and that necessary repairs are taken care of before they become serious. Certainly a truck-mixer operator is a more valuable man than a truck driver for he must have the added experience and knowledge necessary to operate the mixer as well as the ability to properly drive a big truck. Paying drivers enough to keep them on the same work is a very profitable expenditure.

Truck-mixer mounting

Most mixer units are mounted at the factory or by distributors who are familiar with the proper methods. Due to the current shortage of equipment many units are being mounted or transferred in the field and care must be used to secure a satisfactory mounting.

Load distribution to each of the axles of the truck is most important and should take into consideration not only the mixer and its special motor and load of concrete but the weight of the truck itself. The load distribution recommended by practically all motor truck manufacturers is, for conventional four-wheel trucks, 25 percent of the gross load (body, pay load and chassis) on the front axle and 75 percent on the rear axle; and for the cab-over-engine type short wheel-base trucks, about 33⅓ percent of the gross on the front axle and 66⅔ percent on the rear. On six-wheel dual-axle drive trucks the mixer load center of gravity should be located about midway of the two rear axles. However, it is important that sufficient weight be kept on the front wheels to assure good steering characteristics.

Proper procedure is to fill out an information chart giving all pertinent data on the truck and send it to the mixer manufacturer asking for instructions on the proper mounting for the particular chassis. Blanks for filling in the data can be secured from equipment distributors or from the manufacturers and both will be glad to assist in properly mounting the mixers, especially now to get better service from every piece of equipment, but at any time because they know equipment that is not satisfactory from every angle will not bring repeat orders.

The mixer should be mounted with a few inches of space behind the cab for ease in engine maintenance, 5 in. being a desirable figure. Mounting should be done over a ¾-in. thick wooden strip or on brake lining under the frame to act as a cushion, using the angle clips and bracket bars furnished by the manufacturers. It is not necessary to drill holes in the truck chassis, to do so weakens the frame and voids the truck's guarantee.

The editors wish to acknowledge suggestions for this article received from Fred Wilcox of Commercial Concrete Equipment Co., and Stanton Walker, secretary, National Ready Mixed Concrete Association.

More Concrete Being Used in Britain

EXTENSIVE USE of concrete is the characteristic feature of all British wartime building. Details of one of the largest housing schemes—planned soon after war broke out for brick and timber construction and completed now for the most part in concrete and brick—illustrate the varied uses of concrete in dwellings not designed for temporary accommodation.

Foundations are of usual concrete construction. The ground floors are a 4-in. concrete slab on a 6-in. fill of clinker, brick bats, or crushed stone. The first floors and roofs are of either precast concrete beams or of combined precast and cast-in-place construction, while the staircases are precast or cast in place. The walls are normally 11-in. thick cavity brickwork, and the partitions 4½-in. brickwork where load-bearing. Elsewhere the partitions are of 2½-in. cinder construction. Precast concrete was also used for the window trim and external sills, canopies, projecting eaves, parapet copings and balcony balustrades.

On the flat roofs, thermal insulation is applied to the exterior surface. Where the structural concrete topping is laid to falls, the foamed slag construction is in itself considered a sufficient insulation. Where beams are used, a concrete screed of 3-in. average thickness, with a foamed slag aggregate, was laid to falls.

All timber has been eliminated with the exception of some door frames. Cast iron was used only for the rainwater pipes, with no steel employed apart from door and window frames.

Another change, brought about in England by the war, is the use of porous concrete pipe instead of clay piping for many drainage jobs. Usually a very dry mix of five or six parts of coarse sand, sharp gravel, or clinker free of fines, and one part of portland cement is employed. Vertical moulds filled by ramming or vibrating are used and the average output of three men per 8-hr. day is 220 sections of 6-in. dia. pipe in 18-in. lengths. The pipes are not moist-cured or watered while hardening, and a very high porosity results.

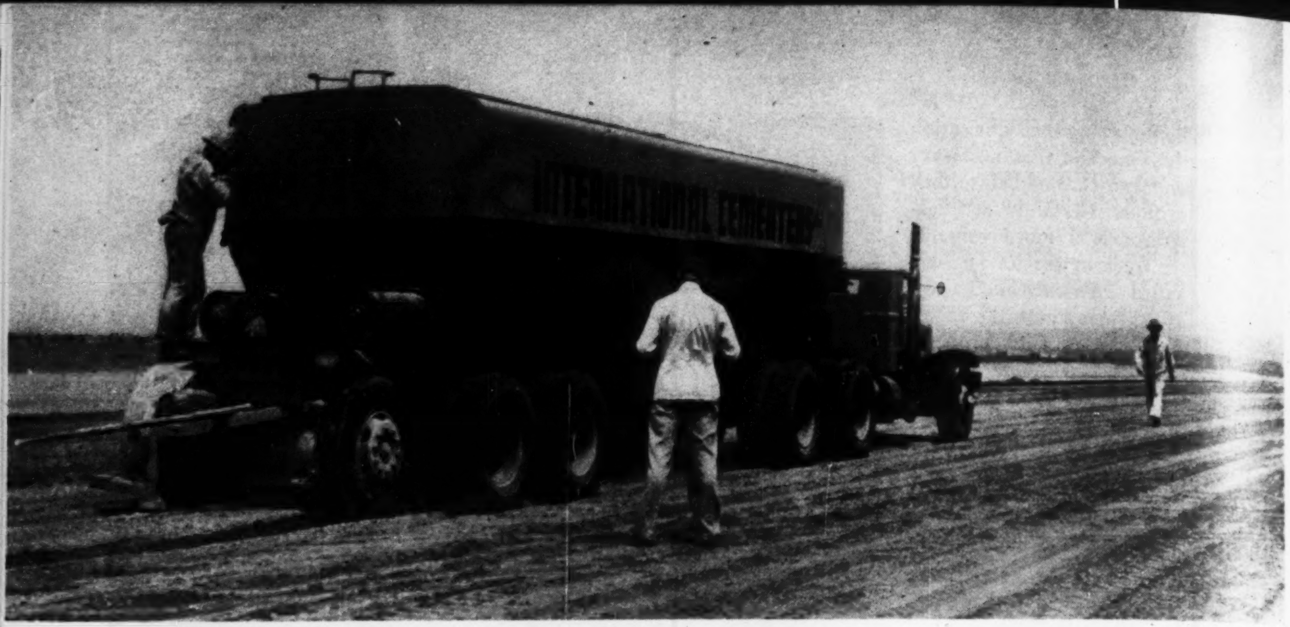


Fig. 1. A bulk cement truck (600-sack capacity) makes uniform delivery to a cement spreader on a two-wheel trailer.

Cement Spreader and Road-Mix Methods Speed Large Surfacing Jobs

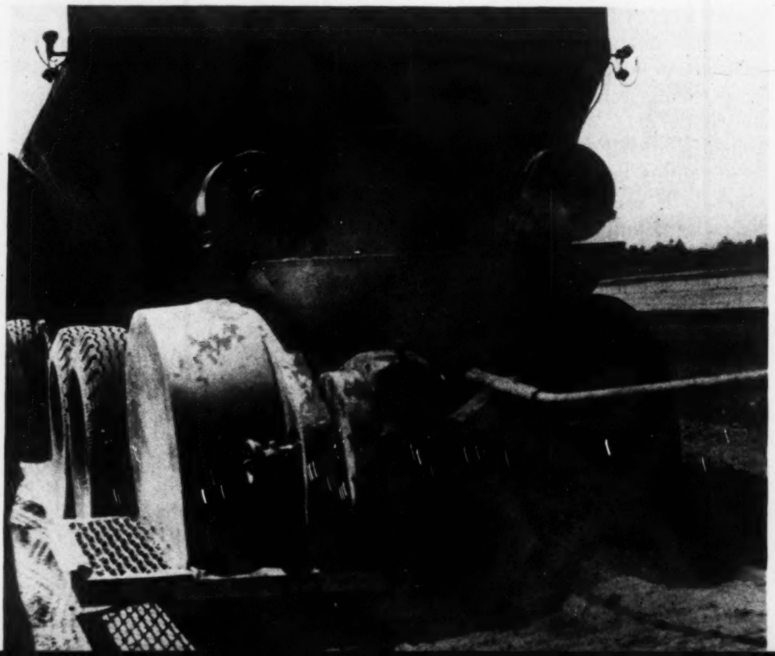
Contents in Brief—*Better distribution of cement in soil-cement base courses and protection of the cement from sudden showers are being obtained in California by the use of bulk distributors developed for use in oil-field operations. These traveling mixers operating in sequence process the mixture in advance of rolling.*

IMPROVED METHODS of getting accurately proportioned cement into the soil for cement-stabilized base courses are being used at military supply depots and on airport runways and highway jobs in California. Specifications for job "A", illustrated in the pictures herewith, call for a soil-cement base of which 168,000 sq.yd. was required in 6-in. thickness for roadway base and 437,000 sq.yd. was needed for "open storage areas" where the surfacing is 4 in. thick. In both thicknesses 12 percent of cement, by volume of compacted earth, was used. For the 6-in. surfacing the admixture was with the top 8 in. of soil and this layer was worked up in operations somewhat similar to the well-known road-mix method of applying asphaltic surfacing materials, finally rolling the surface down to the specified 6-in. thickness.

Use of the bulk cement method avoids problems incidental to the sack scarcity as well as the usual wastage of about 0.5 lb. that adheres to each sack. An even greater advantage, however, is in doing away with the risk of rain damage to cement spread in advance of mixing. With the usual soil stabilization method, 1,500 or 2,000 sacks of cement are sometimes laid out on the ground preparatory to spreading.

For job "A", bulk cement was delivered at a railroad siding three miles from the site and was hauled in a motor truck with a capacity of 28 tons. Distribution was made with a new type of cement spreader with which the labor requirement was only eight men. This crew completed

Fig. 2. Close rear view of spreader depositing a layer of accurately measured cement, 3 ft. wide.



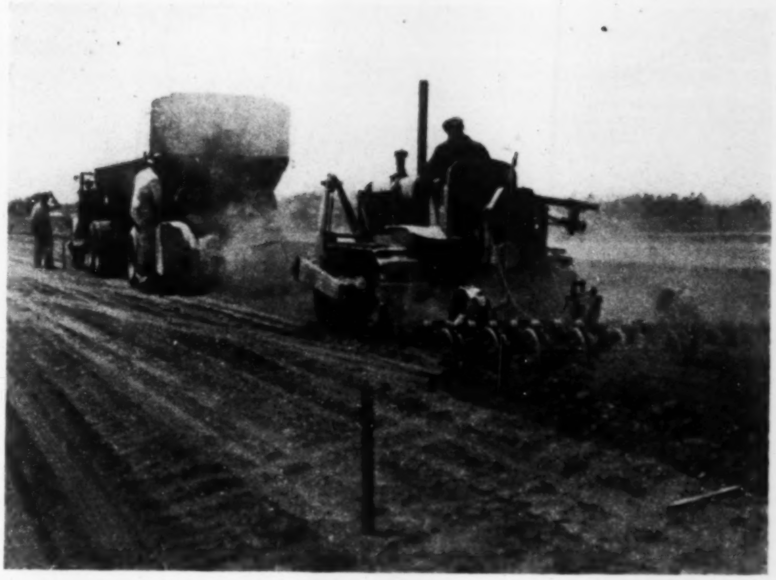


Fig. 3. Behind the spreader a scarifier loosens the soil to a prescribed depth, centering on the 3-ft. cement layer.

the work of spreading cement on a 27,000-sq.yd. area in about eleven hours.

The bulk cement truck was designed for and has been used for some time in the petroleum industry for delivering a continuous supply of cement in the process of "cementing" oil wells. These trucks have a capacity of 600 sacks distributed so that axle and wheel loads comply with state highway laws. Two screw conveyors in the bottom of the cement compartment provide a continuous delivery at the rear end of the truck.

In the field, this constant flow of cement is poured into the hopper of the cement spreader, a device designed for accurate control of the quantity delivered in a layer 3 ft. wide deposited on the ground beneath the spreader as the equipment moves forward. The spreader is attached like a trailer to the rear end of the cement truck. Traveling at about 1½ m.p.h. the spreader places enough cement in the 3-ft. wide layer for a 7½-ft. wide strip of pavement.

The spreader mechanism, carried on a two-wheeled trailer, consists essentially of a rotating drum from which the cement is discharged at a predetermined rate per lineal foot, regardless of the speed of travel. Thus it is not necessary to maintain constant speed while delivering cement.

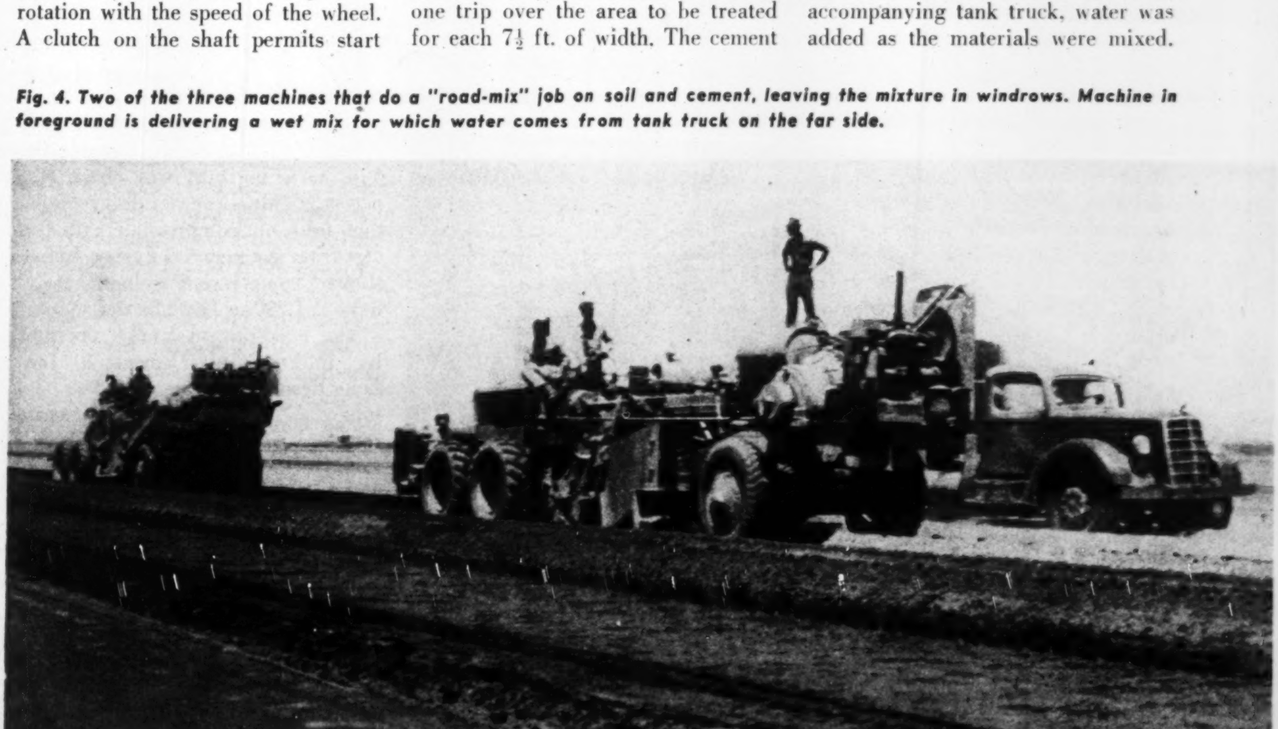
Adjustment of discharge rate to correspond with speed of travel is accomplished by a sprocket attached to one of the trailer wheels through a gear box which drives the distributing drum, thus synchronizing drum rotation with the speed of the wheel. A clutch on the shaft permits start and stop of cement delivery as desired.

The mechanism controlling the rate of discharge permits of very accurate setting. On job "A", the prescribed quantity of cement was 45 lb. per lineal foot for 6-in. soil layer thickness, which corresponds to a 1.9-in. cement thickness over a 3-ft. width. On job "B", where a theoretical total of 63,479 sacks was called for, the actual quantity of cement spread by this machine was 63,715 sacks, an excess of 236 sacks or 0.37 percent. The error of 2 oz. per lineal foot was on the safe side.

On job "A" the bulk cement truck and the spreader following it made one trip over the area to be treated for each 7½ ft. of width. The cement was deposited in a 3-ft. width and directly behind the spreader came a tractor-drawn scarifier, loosening the base material to a prescribed depth (and to some extent spreading the cement) over a 7½-ft. width.

The mixing operations proper were carried out by three machines of the "road-mix" type, known as Gardner Mixers. The first of these, immediately behind the scarifier, completed the dry mix by picking up and working over the top 9 in. of the loose soil layer. Then the second mixer performed much the same operation on the same material except that this time, by means of a connection to an accompanying tank truck, water was added as the materials were mixed.

Fig. 4. Two of the three machines that do a "road-mix" job on soil and cement, leaving the mixture in windrows. Machine in foreground is delivering a wet mix for which water comes from tank truck on the far side.



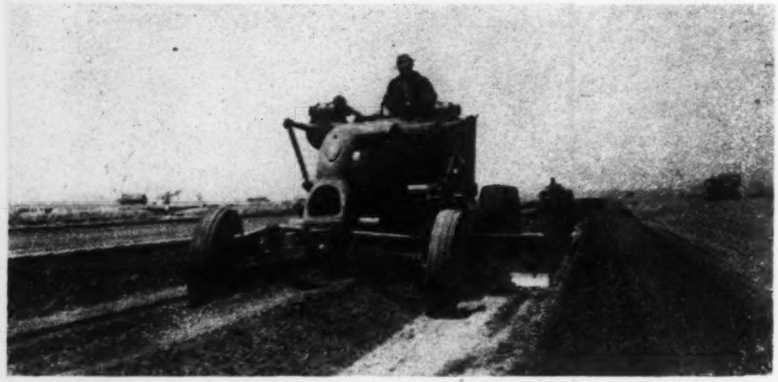


Fig. 5. After three mixing treatments, material (in windrow) is spread by power graders to a 7½-ft. width 9 in. deep (later compacted to 6 in.).

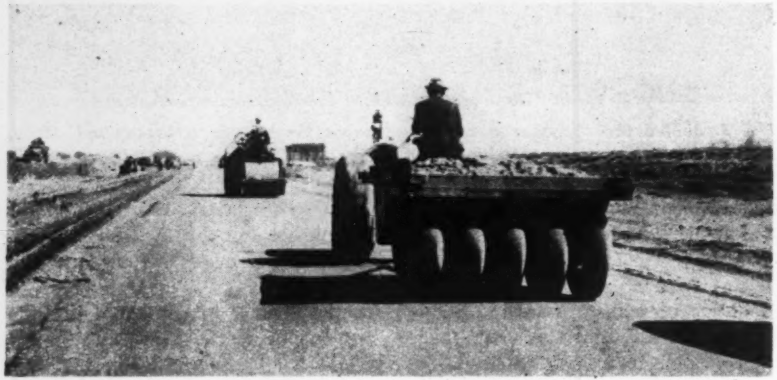


Fig. 6. After several passes of three-wheel 12-ton rollers, the final rolling was done with pneumatic tires.

The third mixing, without additional water, left the cement thoroughly admixed with the soil and with moisture well distributed. The amount of water added in the mixing operation was varied to compensate for variations in moisture content of the soil at different places and at different times of the day.

All three mixer units moved along successively at about the same speed and thus completed preparation for rolling operations on a $7\frac{1}{2}$-ft. strip at about $1\frac{1}{2}$ m.p.h. The third road-mix operation left the material in a windrow over which a grading machine was then run with the blade set for distribution to a 6-in. layer in a strip $7\frac{1}{2}$ ft. wide. After the blading operation a sheep's-foot roller was used for compaction (usually about twelve passes) until it was found that this added very little to the compaction in the sandy soil and it did delay completion with corresponding additional evaporation of water from the mix. Thereafter rolling with a three-wheel, twelve-ton power roller (usually about three passes) was done immediately after the blading and this was followed by final rolling with a pneumatic-tired trailer.

The maximum time lapse in normal operations on job "A" was about two hours between mixing and final rolling. On jobs where temperatures are high and winds tend to dry out the surface, it is customary to operate "fog" trucks most of the time. Optimum moisture content for sandy loam soil was found to be 12 percent. By mixing at about 14 percent in a dry climate, the result was found to be about right when the time came for rolling.

SOIL-CEMENT BASE COSTS

(Figures are for 25,000 sq.yd., 4 in. thick placed in ten hours)

Compaction and rolling.......... (Three 3-wheel rollers, 10 hr. each @ $6.50)	$195
Compaction and rolling......... (One pneumatic roller, 10 hr. @ $6.50)	65
Water, 150,000 gal. @ $1.92/m...	288
Cement, 2,250 bbl. @ $3.20 (0.36 sacks per sq.yd.).............	7,200
Mixing, spreading and compacting. 25,000 sq.yd. @ 8 c./sq.yd. (bid price)	2,000
Curing seal, 25,000 sq.yd. @ ¼ gal. diluted............... (or 13 tons undiluted @ $31)	403
Total	$10,151

Or 40.6 c. per sq.yd.

(The 6-in. surfacing cost about 50 percent more, or 60 c./sq.yd.)

Immediately after rolling on job "A", a mixing-type oil emulsion (SS-1) was put on to prevent loss of moisture. This solution was diluted with equal quantities of water and spread at the rate of $\frac{1}{4}$ gal. of the diluted solution per square yard. This same curing treatment was used on both the 4 and 6-in. surfaces.

After a minimum of seven days of curing, the 4-in. base was finished with a seal coat of penetration-type emulsion (RS-1) at the rate of 1/6 gal. per sq.yd., which was covered over with stone chips ($\frac{1}{8}$ to $\frac{3}{8}$ in.), broomed and rolled. The 6-in. thickness was given a tack or binder coat of the same emulsion (RS-1) applied at the rate of $\frac{1}{8}$ gal. per sq.yd. and then covered with a $1\frac{1}{4}$-in. layer of natural rock asphalt.

Although not yet used as this was written, a moisture content indicator has been devised for future soil stabilization work. This consists of an electrode on a piece of metal so attached to the rear end of the mixer that it projects downward into the earth a few feet behind the mixer. Current supplied from a battery passes through the electrode and then through a rheostat and an indicator.

On job "A", it was stated by H. J. Brunnier, consulting engineer, who held the architect-engineer contract, that unit costs to the government, based on the completion of 25,000 sq.yd. in ten hours, were as given in the accompanying table. The table gives data for surfacing of 4-in. thickness only. For the 6-in. surfacing cement and water were directly proportional to the thickness and other items did not vary appreciably with the additional material. Roughly the 6-in. surfacing cost was about 60c. per sq.yd. Mr. Brunnier also reported that tests on compression cylinders cast from the material during mixing showed compression strengths in 28 days of 1,200 to 1,600 lb. per sq.in.

The bulk cement trucks, operated by International Cementers, Inc., Long Beach, Calif., were used on both jobs "A" and "B." The cement spreader was built by the Link Belt Co. MacDonald-Kahn, Inc., San Francisco, held the general contract on job "A" which was carried out under supervision of the U. S. Engineer Department.

Load-Bearing Characteristics of Landfills

Rolf Eliassen
Associate Professor of Sanitary Engineering (on leave)
New York University, New York

Contents in Brief—*The type and magnitude of settlement in a refuse fill, as well as load-bearing characteristics of this material, are matters of fundamental importance affecting future utilization of landfills. From studies on New York City fills it is revealed that consolidation, although rapid for a few months, will continue over a period of years; and tests indicate that uniformly distributed loads up to 2,000 lb. per sq.ft. will be supported on fills that are no more than two years old.*

SANITARY LANDFILLS function primarily as disposal points for mixed refuse from municipalities, institutions, camps and other centers of population. A secondary purpose of landfills, frequently assuming equal importance with disposal, is the reclamation of waste land. Swamps, marshes, insect and rat-infested areas, borrowpits and other types of submarginal land have been converted to useful purposes in a number of cities.

Prominent among the uses to which these fills are placed in New York City is the enlargement of airport and military establishments. On two projects land was reclaimed from salt marches adjacent to large bodies of water (*ENR* Sept. 25, 1941, p. 423). In addition, a number of parks and other recreational facilities have been developed and several others are planned for fills now being placed. Experience has shown that the use to which a landfill may be placed is limited by the settling characteristics of the fill material.

(Decomposition characteristics of landfill material and methods whereby fill practice may be improved were discussed in an article by Dr. Eliassen appearing in *ENR* June 4, 1942, p. 912).

Settling of the fill may be brought about by compaction of the entire mass and consolidation through physical breakdown and organic decomposition of the individual components of the fill. Actual settlement at any point on the surface of the fill will vary with the depth of the fill, compaction during placing, composition, moisture content and other factors.

Observations have been made on the settling characteristics of a number of landfills in New York City receiving mixed refuse. Owing to the heterogeneous nature of the material comprising each fill, settlement varied from point to point. Therefore, only by a statistical interpretation of literally hundreds of observations can a fair average be drawn. By its very nature, this average cannot in turn be applied to any specific fill. However, the data will serve to indicate what an engineer might expect of a landfill under similar circumstances.

All the results reported here were obtained in tests conducted on landfills in New York City. The average components of the fills were as shown in Table I; moisture content averaged 24 percent.

TABLE I—AVERAGE FILL CONTENT

Material	By Weight	By Volume
Paper	22.0%	46.3%
Ashes	43.1%	19.6%
Food Refuse	17.0%	13.8%
Miscellaneous	17.9%	20.3%

While being placed, the material was subjected to compacting by a 20-ton bulldozer and many heavy trucks with capacities up to 16 cu.yd. Original depths of fill ranged from 10 to 20 ft.

Settlement observations are indicated in Fig. 2. These represent an approximate average of the settling that might be expected on a compacted fill. Original compaction plays an important part in settlement, as the refuse coming to the fill weighs only about 400 lb. per cu.yd., while the material in a stabilized fill would weigh about 1,600 lb. per cu.yd. The fill after compaction should have a density of approximately 1,300 lb. per cu.yd.

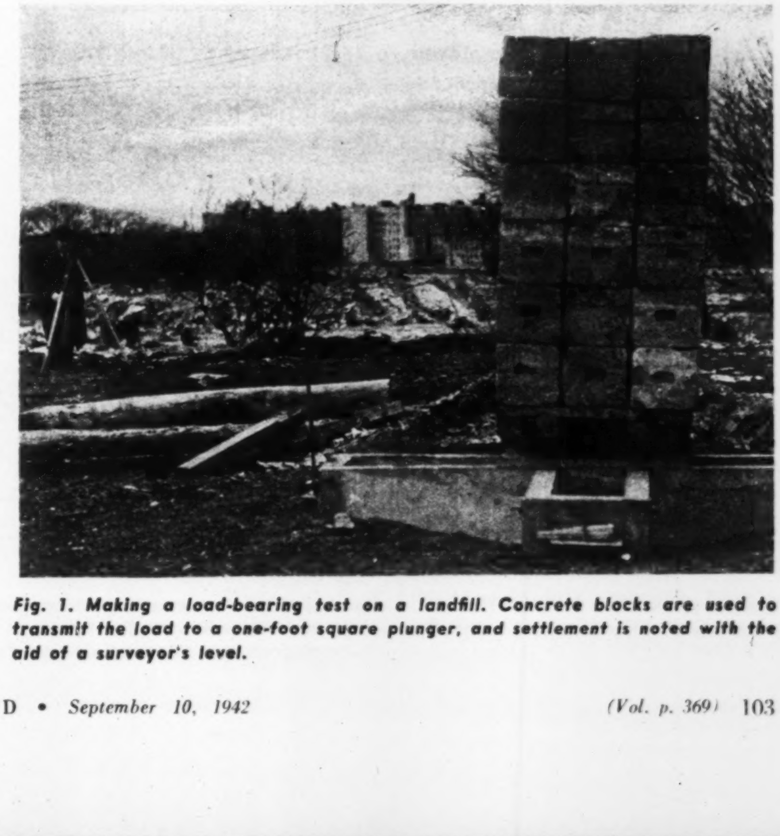


Fig. 1. Making a load-bearing test on a landfill. Concrete blocks are used to transmit the load to a one-foot square plunger, and settlement is noted with the aid of a surveyor's level.

The important conclusion to be derived from these results is that the consolidation, although rapid for a few months, will continue at a slow rate over a period of a few years before apparent stability is reached. Passive decomposition has been detected in fills thirty years old, indicating that ultimate stability is approached but never fully realized.

Utilization of the filled area need not wait upon ultimate stability. However, enough time must elapse after placing the fill so that most of the local disturbances will have taken place. Experience has shown that after two years the surface as a whole will be relatively stable, and that improvements, such as park development, may proceed. Any further lowering of the surface elevation will be minor and generally will occur uniformly over the whole area and not disturb surface conditions.

This uniform lowering of surface elevation occurs only as a result of light uniform loads on the surface and not from concentrated loads. In order to determine the effect of concentrated loads on landfills, many load-bearing tests were conducted. This work was part of the research program carried out by the New York Department of Sanitation and the Works Projects Administration under the supervision of the staff of the Sanitary Engineering Research Laboratory at New York University.

Concentrated load tests

Portable testing equipment was designed to carry out the concentrated loading tests. The loading was applied to the fill through a 12-in. square timber plunger shod with a steel plate. On top of the plunger was mounted a loading platform 3 ft. square. Details of this rig are shown in Fig. 4.

In order to center the plunger, a surface frame of heavy timber was provided to cover the test pit. This served also to insure good footing for the operating personnel while lifting and placing the test rig. To further safeguard the workers lest the load be placed over a void that might cause the plunger to drop suddenly, holes were drilled in the plunger at various elevations and movable stops inserted. These stops then would come in contact with the surface timber if a quick settlement took place. Such an incident never occurred, but the existence of the stops and surface frames instilled confidence in the workers while handling the heavy weights placed on the platform.

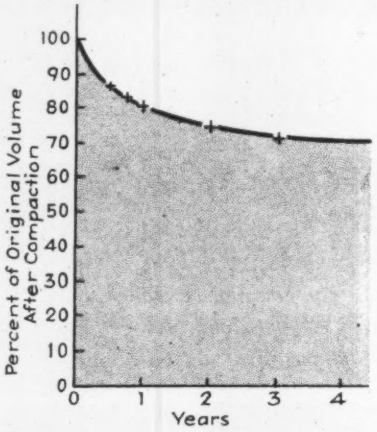


Fig. 2. Average settlement that might be expected on a compacted landfill.

Loading was accomplished by means of concrete blocks. Hand holes were cast in the blocks to insure ease of handling during testing or in transportation.

Bearing tests were made on the surface and at depths of 4 and 7 ft. For surface tests, the top cover of 6 to 12 in. of sand was scraped away. The loading shoe and plunger were placed directly on the compacted refuse.

After assembling the rig, the platform was loaded progressively with blocks. Each load was maintained for at least an hour, or until settling virtually had ceased. Loadings were carried up to 8,000 lb. per sq.ft. Since lever and dial-type settlement gauges were not adaptable to these tests, a surveyor's level was used. Engineering personnel were present at all times during loading and served as observers and recorders.

After each test was completed, the site was examined by augering or excavating to the bottom of the fill to make certain that no large object was present underneath to support the load in a manner not typical of landfills. Where this condition was found, the data were discarded.

Settlement under load

Throughout the course of these studies 44 sites were tested. Results varied considerably, depending upon the components of the fill and other factors previously noted. Settlement

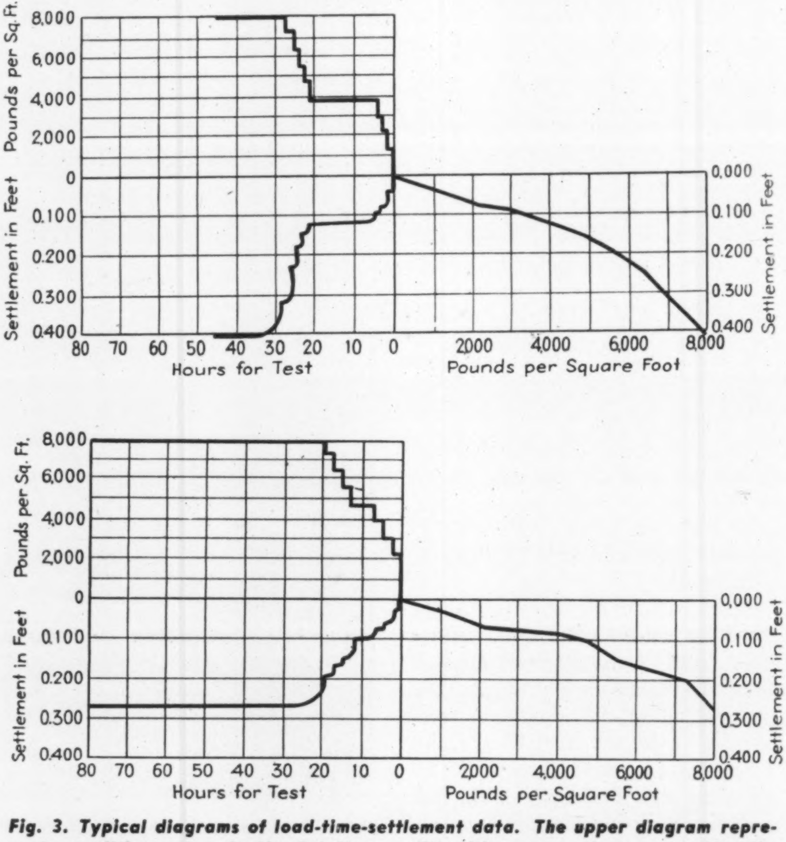


Fig. 3. Typical diagrams of load-time-settlement data. The upper diagram represents conditions at a depth of 4 ft. on a fill with an age of seven months; the lower diagram was plotted from data on a 2½-year fill.

under surface loadings were somewhat inconsistent, but the results obtained at the lower depths followed a general trend. The total settlements under a final load of 8,000 lb. per sq.ft. have been averaged for each depth of applied load and age of fill and are presented in Table II.

TABLE II—AVERAGE SETTLEMENT OF 1 SQ. FT. PLUNGER WITH A LOAD OF 8,000 LB.

Age of Fill	4 ft. Depth	7 ft. Depth
7 months	0.44 ft.	0.13 ft.
14 months	0.54 ft.	0.27 ft.
21 months	0.37 ft.	0.34 ft.
30 months	0.25 ft.	0.29 ft.
120 months	0.11 ft.	0.08 ft.

In order to be able to evaluate the results of settlement under lighter loads, the data for individual tests were plotted on load-time-settlement diagrams, as generally used in foundation practice. Two typical diagrams are shown in Fig. 3.

Analysis of the results shown in the diagram and in Table II makes it evident that older fills will support greater loads with the same degree of settlement, or the same load with less settlement. The same holds true for loads carried to greater depths in the fill. In all cases, the amount of settling is appreciable when the fill is subjected to a concentrated load.

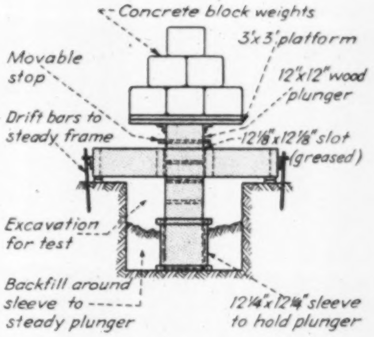


Fig. 4. Portable rig designed for concentrated load tests.

Conclusions reached

On the basis of these tests, together with other observations in the field, certain conclusions may be drawn and applied to foundation practice on landfills. Pier or column footings for walls or buildings should not be used as they cause concentrated loads which will lead to local settlement. Each footing under a building may not settle the same amount, causing possible warping and stressing of the structure above.

These tests prove that a landfill will carry a substantial load. Reinforced-concrete footings or mat foundations will serve to distribute the load over the entire area under any structure. Furthermore, the settlement will be small and will tend to be nearly uniform. Loadings of this type up to 2,000 lb. per sq.ft. readily may be used on fills over two years old without experiencing settlement greater than one inch. Provision can be made in the design of the foundation to care for this small amount of movement.

Landfill studies of this nature should serve to clarify some of the questions that have been raised by many engineers regarding the settlement to be expected and the load-bearing characteristics of the fills. Settlement has been considered in two categories.

The first is related to general consolidation of the fill that begins with the original compacting, continues quite rapidly for the first six months, then tapers off to a gradual minor lowering of the surface of the fill. The second category is the local settling caused by a structural load superimposed on the fill. Provision must be made in the foundation for the structure to distribute the load and thus obtain a small uniform settlement under the entire structure.

Iron and Steel Corrosion Traced to Bacterial Action

Bacteria, chiefly of the anaerobic type, have much to do with the corrosion of iron and steel in natural, underwater and undersoil environments, according to A. H. Thomas, chief chemist of the American Rolling Mill Co. research laboratories.

These bacteria are not pathogenic and may be classed in two general groups, namely, sulphate-reducing and iron-consuming. Biologists have been well acquainted with their manner of living and their biologic characteristics. Their life processes, however, have only recently been associated and correlated with the corrosion of iron and steel in underwater and soil service.

Kinds of organisms

There are perhaps several species of the sulphate-reducing type, but usually most of them are associated with the *disulfuricans* group. These organisms reduce the sulphates in water and liberate hydrogen sulphide, which is known to be severely corrosive to iron. This results in the formation of ferrous or iron sulphide.

The so-called iron-consuming bacteria do not actually devour metallic iron as a food, but do require ferrous iron for their sustenance and growth. The most common of these organisms —*crenothrix*, *leptothrix*, *spirophyllum*, and the capsulated form *cocobacilli*—consume ferrous iron in aqueous solution, exuding it through their outer skin or cell wall as red ferric hydroxide or a similar insoluble ferric compound.

Ordinary mineral analysis of water and soil has been used many times in an effort to determine their corrosivity to steel, yet there are cases on record where chemical analyses indicated non-corrosive conditions and the actual service behavior was opposed to these pre-analyses. Bacteriological examinations of the water or soil and the corrosion products reveal, however, that certain types of bacteria contributed importantly to the severe corrosion that occurred. There are no data proving that these bacteria are directly responsible for the severe corrosive attack, but even so their presence results in the formation of chemical compounds that either directly attack the metal or establish conditions conducive to electro-chemical attack.

Treatment methods

When these organisms are present in water, reported Mr. Thomas, there are prescribed treatments that will eradicate them, rendering the water inactive from a corrosion standpoint. The most common and inexpensive treatment methods known today are the chlorine and the chlorine-ammonia (chloroamine) processes. These destroy the living bacteria and prevent their growth and accumulation in pipelines and other water-handling equipment. Where untreated water is infested with these organisms, application of a good coal-tar base enamel coating to the metal is advisable.

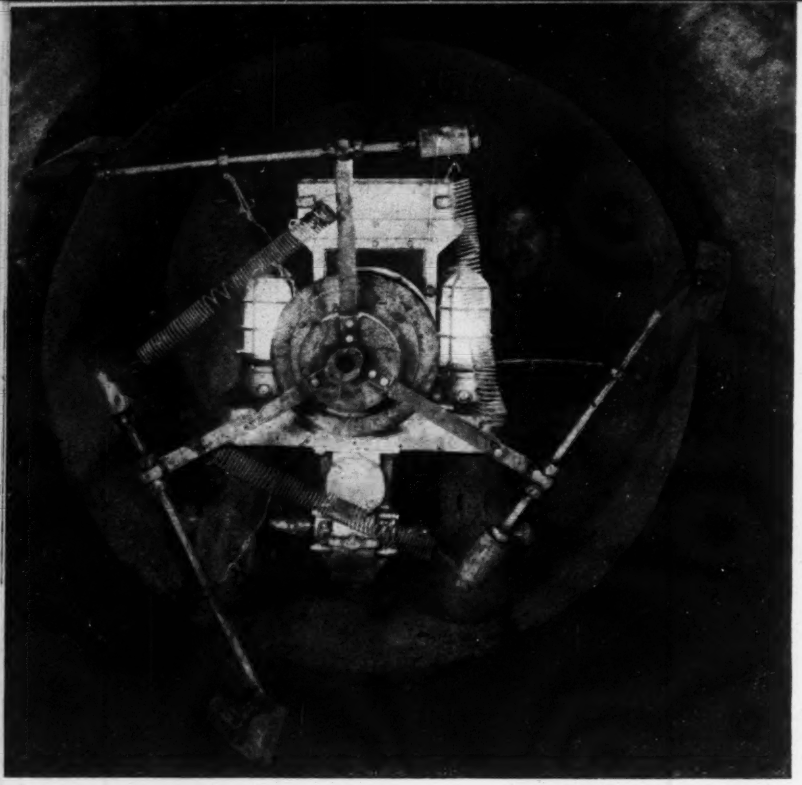


Fig. 1. Traveling through the inside of the pipe, this machine "sprays" a cement-mortar that is then troweled to produce a smooth inner lining of ¼-in. thickness.

Lining Cast-Iron Pipe In Place

Lewis H. Seton

Assistant Superintendent, Centriline Corp
New York, N. Y.

Contents in Brief—*When Waterbury, Conn., decided to complete the installation of a supply main, part of which was laid nine years ago but not used, it was decided to clean and line with cement mortar some two miles of 36 and 42-in. cast-iron pipe. Cleaning and lining operations, performed with a centrifugal machine of special design, were carried out at the rate of 1,000 ft. a day.*

APPLYING a one-quarter inch cement lining at the rate of 1,000 ft. a day to cast-iron pipe already installed was accomplished recently at Waterbury, Conn., when that city decided to complete construction of a transmission main on which work had been started some years ago. Because of excessive tuberculation occurring in existing pipe in older parts of the system, it was deemed advisable to protect the new conduit with a lining before it went into operation.

The situation was rather unusual. About eleven years ago the city planned the installation of a line from its supply reservoir, purchasing the cast-iron pipe in installments as funds became available. Installation was to be undertaken at some future date, when all the pipe had been obtained.

However, after some pipe was on hand construction was begun on a new highway running along the right-of-way of a section of the pipeline. To avoid the necessity of future work in digging up part of the completed highway, it was decided to lay some two miles of pipe immediately. Then, subsequently, when the balance of the pipe was available, it was to be connected to both ends of the section.

In 1940, after this pipe had been in the ground about nine years, it was decided to complete the transmission main. To eliminate the excessive tuberculation to which existing pipe in the old system had been subjected because of aggressive water, and to assure a permanently high carrying capacity in the new main, it was decided to use reinforced-concrete pipe for the balance of the work. In order to provide a concrete lining throughout the entire length of the main, the decision was reached to clean and line with cement mortar the cast-iron pipe already installed. This pipe had been in the ground during this long period but never had been used to convey water.

A contract was awarded the Lock Joint Pipe Co. for the installation of the cast-iron pipe on hand, for furnishing and installing the concrete pipe required, and also for the cleaning and lining of all the cast-iron pipe. The latter item consisted of cleaning and lining with ¼-in. cement mortar a total of 9,400 ft. of 36-in. and 1,300 ft. of 42-in. pipe. Cleaning of the pipe was undertaken by the Lock Joint Pipe Co., but the placing of the cement mortar lining was done by the Centriline Corp.

Pipe cleaning procedure

Specifications for the cleaning of this pipe called for the use of a mechanical cleaning device. As hydraulic cleaning was impracticable because of the difficulties of obtaining water at the required locations when this work was scheduled, a special type of cleaning device was developed.

This consisted of a machine built to travel along the inside of the pipe with a rapidly revolving shaft located at the approximate center of the pipe. To one end of this shaft was attached a number of pieces of chain each a little longer than the radius of pipe to be cleaned. To the end of each piece of chain was welded a small casting made of wear-resisting steel.

As the machine traveled along the inside of the pipe, the centrifugal force created by the rapidly revolving shaft causes the steel casting to rub against the inside surface of the pipe creating an abrasive action, which effectively removed all paint and foreign matter from the interior surface. This same action also roughened the interior of the pipe, thus providing a more satisfactory surface for the bond between the cast-iron and the cement mortar to be applied later. A blower was set up outside the pipe for the purpose of forcing a continuous draft of air through the pipe to carry paint fumes and dust particles away from the operator. About 1,000 ft. of pipe was cleaned daily by this method, and job was completed in about ten days.

Details of lining machine

The specifications required that an approved centrifugal machine be utilized for the placing of the cement mortar lining, the essential features of which were: (1) A head revolving at high speed projecting the mortar against the wall of the pipe at high velocity, the impelling force to be centrifugal and no air to be utilized in the process of mixing or application; (2) provisions for troweling a smooth surface finish to the mortar; and (3) means for progression of the machine ahead of the lining so that nothing would come in contact with the troweled surface until it had attained its initial set.

Further stipulations were that only machines of such design as had successfully placed cement lining and had been in service for at least one year would be acceptable. And control of machine placing of the mortar was to be provided to assure uniform thickness of lining, this thickness to be nowhere less than ¼ in. on the pipe surface.

The lining machine that complied with these requirements was somewhat similar to the cleaning machine in that it traveled along the inside of the pipe and had a rapidly revolving shaft located at the approximate center of the pipe. (Fig. 2.) In place of the abrasive chains, there was fastened to the shaft a head consisting of two metal disks about 6 in. apart. Between these disks steel plates were welded at fixed intervals around their circumferences. Mortar was fed to the head by a spiral conveyor that passed through its center, and centrifugal force created by the rapidly revolving head threw the mortar against the inside surface of the pipe in the form of a fine spray. The thickness of this lining was regulated by changing the speed of travel.

A series of slowly revolving trowels, connected to the revolving shaft, followed behind the head and troweled the surface of the mortar to a smooth, glass-like finish.

How lining was placed

First step in the lining operations was to remove 6-ft. sections of pipe at intervals of 1,800 ft. along the line. This was for the purpose of admitting to the inside of the pipe the machine and the cement mortar, and also to allow entrance and exit to the workmen. Additional circular holes 8 in. in diameter were cut through the pipe midway between these intervals. These were for the purpose of accelerating the delivery of cement mortar from the mixer above the ground to the hopper of the lining machine.

Each open section was replaced and connected with Dresser couplings before the machine reached that point in the line. The machine then continued the application of lining, leaving an unbroken surface of smooth concrete. The 8-in. holes were covered with sandbags as the lining machine passed them. Later the bags were removed, the cement mortar chipped away, and the holes sealed with plugs of special design.

In order to assure a smooth surface at the joints, it was necessary to pack a dry mortar into them from the inside of the pipe thus making a smooth surface across each joint. This was done ahead of the lining operations.

Sequence of operations in the lining of the pipe was as follows: Mortar, consisting of a mixture of one part standard portland cement to one part screened and dried sand (by weight) was mixed to a low water-cement ratio in special mortar mixers above the ground and dumped through a short section of chute into small rubber-tired buggies in the pipe. These buggies transported the mortar to the lining machine where it was transferred to the receiving hopper of the machine. As described previously, a worm mechanism in the machine forced the mortar to a rapidly revolving head that sprayed it against the inside wall of the pipe in advance of the trowels.

It was found that there was sufficient moisture present in the interior of the pipe, due to condensation, to provide ample curing of the mortar. A short time after the line was completed, it was filled with water to provide additional curing.

The lining machine averaged about 1,000 ft. of progress per day, the entire operation being completed in about ten days. The entire job, including the cleaning and lining, was completed in less than one month.

Malcolm Pirnie of New York City was consulting engineer on the project. Charles A. Root, chief engineer for the city of Waterbury and Henry Whitlock, assistant engineer, were in direct charge of the project operations. Charles A. Erskine was the superintendent for the Centriline Corp. and the writer served as his assistant.

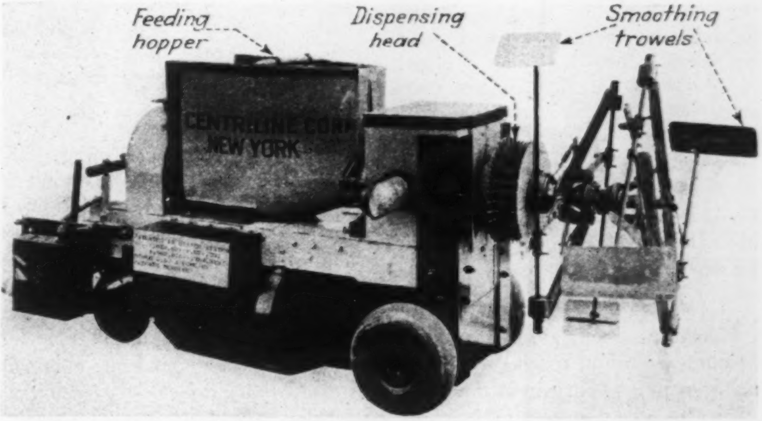


Fig. 2. Centrifugal cement-lining machine is a compact, mobile piece of equipment operated electrically. Cement-mortar from the hopper is fed to the rapidly revolving dispensing head from which it is thrown off at high speed to the inner surface of the pipe. Slowly turning trowels give a smooth finish and even thickness to the lining as the machine moves backward and away from the work.

New Aids For Water Well Drilling

***Contents in Brief**—Instruments and techniques developed in oil fields work might find useful application in water well drilling. The following account, written by Carl A. Bays, special geologist of the Illinois Geological Survey, is taken from a recent issue of The Illinois Well Driller.*

SPECIAL STUDIES now being made in the Joliet region, where the public and industrial water supplies are being rapidly drawn on by war industries, direct attention to a number of instruments and practices developed for oil field work that might be used in water wells to furnish geological and drilling data and thereby ultimately to increase yields or make certain supplies more useful. From the results of such studies the value of shooting certain horizons, the wisdom of casing-off others and possibly other matters of importance can be determined.

For example, the ordinary oil field electric log may give some information of value. The recording truck is driven to a well and an electrode on a special line is run to the bottom of the hole. Electric circuits between points on the electrode, or the electrode and ground, gauge the resistance and potential of the fluid in the well and from these measurements the resistance and porosity of the wall rock are indicated. Under normal conditions the actual making of such an electric picture of a well takes less than an hour in a 2,000-ft. hole. The record is made on film in the recording truck and the permeability and resistance are indicated by curves so that a foot by foot vertical comparison of the wall is possible.

Making a caliper survey

A device that may aid in answering the question of how much good a shot has been in any horizon is the "hole caliper." Caliper surveys measure accurately the diameter of the hole from the bottom to the top, a graphic record being recorded electrically. This instrument might have two applications in water walls: (1) in determining the size of hole in caving formations and the amount of cement necessary to take care of setting pipe through a caving zone; and (2) in determining the value of shooting any horizon by running a caliper survey both before shooting and after cleaning out.

Determining fluid levels

A method of observing well water levels, especially where casing leaks and other producing troubles may develop, involves the use of the "echometer" by which fluid levels can be rapidly determined without removing any operating equipment from the hole. This device is a sound reflection instrument. A blank cartridge is fired and as the sound waves passing down the hole are reflected they are picked up by a very sensitive microphone and recorded mechanically on a graph. The reflections indicate the exact position of equipment above fluid level in the hole, as well as to top of fluid.

It is possible that in some water wells porous horizons, which do not have sufficient head to produce water in desired quantities, when uncased and under the head of other higher or lower prolific zones may steal or "thief" part of the water produced from the better zones. Electric logging would give some clue as to whether any horizon is porous enough to do this, but other observations are needed to find whether it actually takes place.

A modified form of the current-meter, similar to that used in measuring rate and direction of flow in streams, can be used in the same manner in wells to determine whether thiefing is taking place. Also the current-meter could be invaluable in locating sizeable casing leaks.

It is believed that considerable information of value could be obtained by use of the cable tool core-barrel in water wells. Cores can be cut and from them porosity and reservoir data determined in the laboratory. The State Geological Survey has a cable tool core-barrel which can be made available for use in water wells in areas of interest to the survey, provided it is used at the owner's risk.

One possible method of opening up water horizons that have been cased off and cemented is the use of the gun-perforator, much used in the oil fields. The gun consists of a cylinder lowered into a well on a special line and from which bullets are fired electrically from the top of the ground. Surprisingly good penetration of the casing, cement and formation is obtained by this method. Thus a possible gravel bed that has been cased off, or a light-producing zone, can be opened for testing and production.

Another use in wells for the gun-perforator is as a substitute for nitroglycerine shooting in certain cases. Bullets are shot directly into the open formation and considerable shattering results. This method can be used where pipe has been set too close to a producing zone to allow safe shooting or where the nitroglycerine may tend to "burn" or compact the producing zone. The method has been found to have wide application in opening the faces of producing horizons.

Most of the services described here are available in Illinois from various oil field service companies. The State Geological Survey has more complete information on these tools, instruments and practices and is available to furnish data concerning them or assist in interpretation of results in areas of interest to the survey.

Water Emergency Corps For Illinois Cities

City waterworks superintendents in Illinois will head up a state-wide emergency water corps of city employees that will perform inspection and other duties as a wartime measure and be trained to act in a disaster, according to the American Public Works Association.

In the large cities several districts may be created, with a key man and assistants assigned by the chief of the local program. Tools and emergency supplies will be stored conveniently within each district.

Water Meter Testing on a Mass Production Basis

***Contents in Brief** — Handling 160 meters at a time instead of the former limit of ten, a new water meter test bench developed by the Los Angeles Department of Water and Power is said to increase efficiency and accuracy. The following account is taken from Intake, the department's publication.*

Mass Production Methods in testing water meters have been developed and put into operation by the meter and service section of the Los Angeles Department of Water and Power. This procedure has resulted in increased efficiency and accuracy of

Through perfection of a new set-up, a bank of 160 water meters, in either the $\frac{5}{8}$ x $\frac{3}{4}$ or $\frac{3}{4}$ x 1-inch sizes, may be tested at one time, where formerly a total of only ten could be tested simultaneously. These two sizes represent approximately 75 percent of the 311,095 meters in service.

In making a test, the test tank is filled with exactly 10 cu. ft. of water, a valve is turned and the water permitted to flow through the 160 meters, which are connected in series.

When the tank has been emptied, and if the meters are 100 percent accurate, each will show on its dial a reading of 10 cu.ft. Any variation over or under that quantity represents the percentage of error. Tests made to date disclose an average accuracy of 98.38 percent.

Since monthly water bills are computed from the consumption registered by the meter, it is highly important that the meters be maintained at as high a percentage of accuracy as is humanly possible so that the customer pays only for the water actually consumed and the department is paid for all the water it supplies.

Periodic tests made

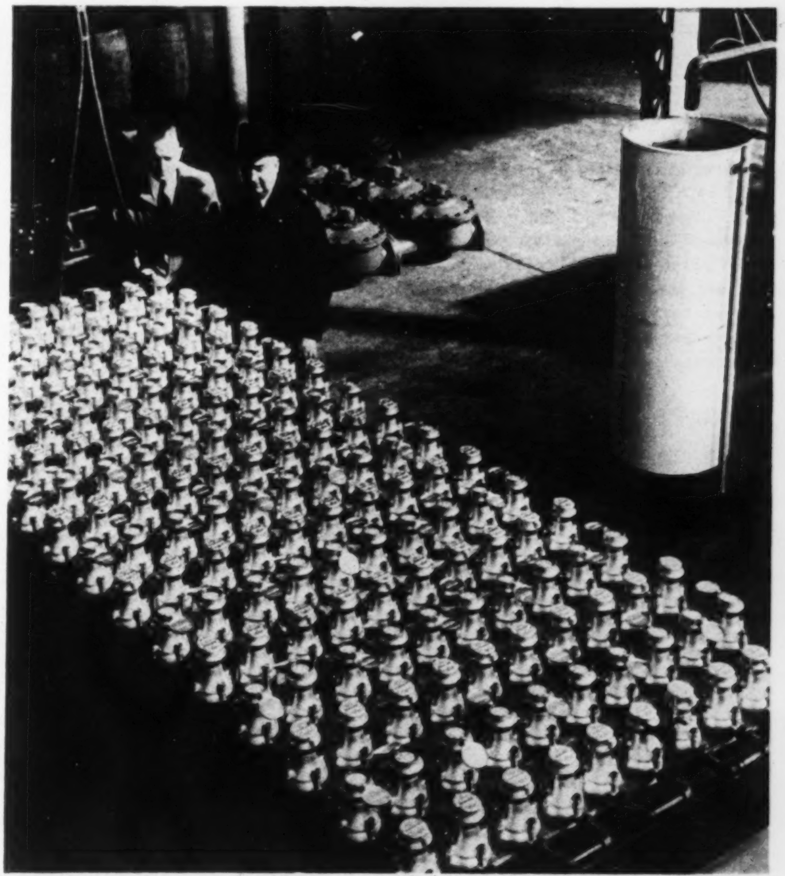
In addition to meter tests before installation, periodic tests of meters in service are made. At regular intervals several meters from different sections of the municipal water system are brought into the shops for test and inspection, it was stated by George C. Sopp, superintendent of meters and services. Average number of meters tested monthly is 1,600, about equally divided between new and old meters.

Records show that meters which have been in service as long as 20 years still give satisfactory performance. Such excellent service is due in part to rigid purchase specifications.

Whenever a new shipment is received from any of the several manufacturers, several meters are selected at random and subjected to exhaustive tests which include registration, ability to withstand hydrostatic pressures up to 350 lb. per sq. in. and chemical analyses of the main casing, register gearing, train gears and measuring chamber.

Today the water distribution system's more than 300,000 meters record the monthly consumption of some 1,500,000 city inhabitants. In the last fiscal year the system distributed an average of 219,000,000 gallons daily, of which 175,000,000 gallons were for domestic consumption at the low municipal rate of 14.8 cents for 100 cu. ft. Daily consumption per capita was 119 gal., which would cost a fraction over two cents.

In contrast with the simplicity of making water charges on a metered basis, is the method used in Los Angeles in 1907. At that time a complicated water rate schedule was employed. First consideration in determining the base water rate then was the number of rooms in a house, a different rate applying for each size home from three to ten rooms.



Los Angeles Dept. of Water and Power photo

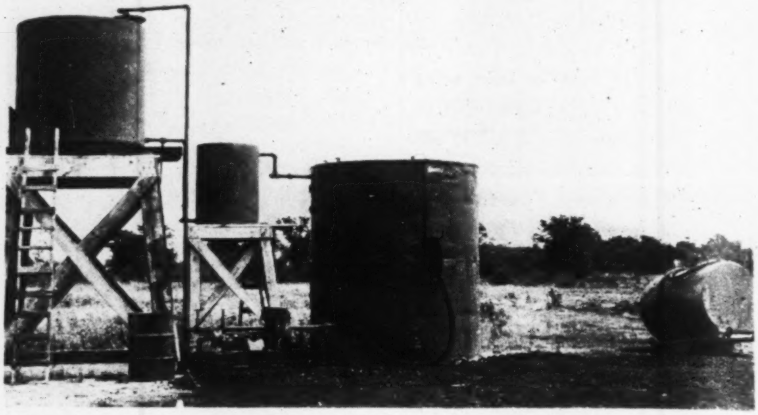
New water meter test bench on which 160 meters are connected in series. Accuracy of individual meter registration is determined after a flow of ten gallons (measured in tank at right) passes through the bank of units.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS

A Handy Job-Made Filtering Unit for Make-up Water

In many areas much municipal water is so charged with carbonates as to introduce a serious problem on construction work where numerous internal combustion engines with the usual radiator-type of water cooling are employed. The calcium deposits in the common copper-tube radiator cannot be removed by an occasional flushing with hydrochloric acid, as from house-heating units, since the second or third such treatment would probably denote the end of the radiator core. One company noting that the surface water was suitable for radiator refills, installed the simple portable water supply unit illustrated in the accompanying photograph for removing the vegetable matter carried after rains. The whole unit was transportable on trucks to a site near where the radiator refilling water was needed.



Job-made plant to treat surface water when other supplies are unsuitable. At the extreme left is the 50-bbl. raw water tank, the next tank is the 10-bbl. filter, and the third is the 100-bbl. storage reservoir. The tank at the right is mounted on skids and proves very handy in distributing the treated water.

A 50-bbl. storage tank mounted on a sectional tower 12 ft. high serves as raw water storage. Flow from this tank is into the bottom of a 10-bbl. tank about two-thirds full of sand and graded gravel beds. Flow from the top of this unit goes into a 100-bbl. storage tank, from whence filtered water is drawn and trucked to the various pieces of equipment with radiators and internal-combustion engines.

A gear pump, powered by a 1-hp. single-cylinder gasoline engine, serves for all transfer of water. By means of a simple manifold, which removes raw water from the collecting ponds, the pump can store water in the 50-bbl. unit. By shifting valves the pumps may supply either clear or raw water through the 10-bbl. filter tank, either for counterflow cleaning or simply to flush it through under pressure. This pump also may be used very successfully to fill the transfer tank on the back of a truck more rapidly than gravity could be expected to accomplish this end.

The 10-bbl. filtering unit is not equipped with manhole or other means of access into the tank, and the tank cover was welded in place on the job after the filtering materials had been added. The coarse gravel, placed first, was followed by a uniform thickness of fine gravel, next washed sand was used for the top layer. Unless the 10-bbl. tank is rolled over or transported on one side, the relative position of the various filter-

GROUP-MOUNTED WELDING SETS

Now that welding has replaced nine-tenths of the riveting in steel ship construction, mobility of the sources of direct current for welding has become an important factor in speed. At one West Coast shipyard motor-generator sets are mounted in groups of six on a steel frame provided with a roof for weather protection and convenient projections on top of the steel frame into which the lifting hooks of a crane fit readily. This arrangement makes it easy for a crane to pick up one of these units and set it where it will be most convenient for the next welding operation.

In the picture note the open construction of the welding floor which affords access to the underside of steel assemblies.

Steel frames, mounting half-a-dozen welding units, roofed for outdoor service, have steel "ears" on top for crane hooks.

ing materials remains unchanged in transportation of the filter unit to new locations.

In case the unit is set up at some point where the previously constructed surface-gathering pits have not filled, it may be necessary to truck in raw water from some nearby watercourse or other natural supply. In such cases the same hose that is normally used for filling the distribution tank may be used as the suction line to transfer the water to the raw water storage. Use of the hose instead of rigid pipe connections also eliminates the need for close spotting of the truck and snubs any vibration from either pump or truck unit.

If such a plant as described is used for treating the water, the radiators. which with an available muncipal water supply would require flushing with acid at intervals of three weeks to as many months, and which therefore would pile up a staggering bill for replacement of cores, will operate for years with no maintenance other than an occasional draining to remove the little silt carried into the radiator.

When the approach of winter makes necessary the addition of anti-freeze compounds, water from the radiators is run through the filtering unit and any rust in the water is successfully removed by the vegetable matter mechanically trapped in the gravel and sand filter.

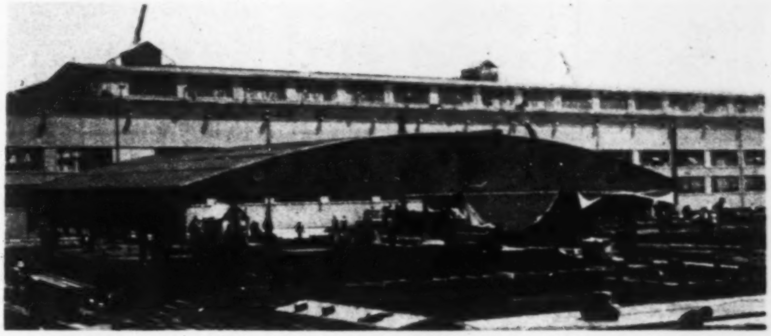
For severe winter service it would be necessary to lag all three tanks.

—Elton Sterrett.
P. O. Box 6536, Houston, Texas

Earth Fill Via Concrete Mixer

On a recent rush job for a war-industries plant, it was necessary to place an earth fill with an accurately controlled moisture content and to proceed with all haste, using the equipment that was then at hand. These requirements were met by dumping the dry fill material into a hopper whence it could be fed at uniform rate into a concrete mixer that was kept turning continuously in the "discharge" position.

The required amount of dry earth and the prescribed quantity of water were fed in continually and the mix- in a continuous flow. The result was ture, after a few turns, was discharged a well-mixed combination, which was hauled to the fill and immediately rolled with satisfactory results.



Protection for the outdoor assembly areas is provided by canvas-covered frames.

Movable Weather Protection On Shipyard Assembly Areas

The assembly areas, 75 ft. wide, just ahead of the ways at Richmond shipyards No. 1 and No. 2 were designed for welding operations with heavy timber construction topped off by steel rails. Protection against weather is provided by frames with a canvas covering that move on steel rails lengthwise of these areas. Some of these frames are 60x75 ft. in plan consisting of a steel framework with timber roof trusses supporting the canvas. Several types are provided: one of the larger ones, adapted to the nearly flat (27x50 ft.) side sections of EC-2 hulls is shown in the accompanying picture.

Steel Assemblies Are Rotated To Permit Downhand Welding

Steel standards are set up in the plate shop at Richmond (Calif.) shipyard No. 2 designed to rotate a steel assembly and to hold it in whatever positions are most convenient for welding. The device consists primarily of two uprights each supporting near its upper end a vertical disk mounted on a bearing and provided with holes near the periphery through which steel rods can be thrust.

The standards are spaced at the right distance for taking the steel assembly, which is received with all parts spot-welded in position for final welding. The assembly is bolted to the rotating disks and then turned to the best position for downhand welding. By putting pegs in one of the holes in the disk, the assembly is prevented from making any further rotation until the welding is completed. With the disk holes only a few inches apart, the piece can be held in almost any desired position, or in several such positions, greatly facilitating welding operations.

These standards are of various sizes and are used on anything up to about 2,000 lb. with a rotating radius of about 9 ft.

Typical assembly on rotating supports that speed downhand welding on both sides.

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

More About Camouflage

CAMOUFLAGE WITH PLANTING—By Ralph Rodney Root. 79 pp. Published by Ralph Fletcher Seymour, 410 So. Michigan Ave., Chicago, Ill. $1.50.

An aspect of industrial camouflage not adequately covered in existing texts on camouflage is considered in this small book by one of the country's well-known authorities on landscaping. Emphasis is laid on the importance of planning for camouflage in advance of construction, and much of the text is devoted to that aspect of the work. Considerable space also is devoted to the photographic values of foliage because of the importance of these values to effective camouflage. Included is a table of shrubs and trees available for camouflage planting classified as to leaf color, leaf-color production types, plant height and geographical zones in which the plant can be used. For the engineer engaged in camouflage work, the text would have been materially improved by inclusion of a chapter giving specific information on planting for camouflage effects. Such questions as spacing of trees and shrubs to disrupt shadows with the minimum amount of planting, proper grouping of plants as to height, placing of trees and shrubs with respect to shadow zones, and the proper handling of shrubs to get the desired color effects are not answered in this or any other text on camouflage.

Water Treatment Data

DATA BOOK—Compiled by the Permutit Co. 47 pp. Free distribution by the Permutit Co., 330 W. 42nd St., New York.

Waterworks designers and operators, particularly those concerned with water-softening problems, will find this handbook to be a practical aid in the solution of hydraulic and treatment-process problems. Essentially the book is a compilation of data and tables ranging from tank capacity and pipe friction computations to dosage of coagulants and the mathematics of chemical reactions. But it goes beyond this, and in one section provides a complete analysis of water-softening processes. From this an engineer may predict the composition of the effluents produced from any water supply by various treatments, the dosages of required chemicals and the most economical form of treatment to be selected.

Two Books on Highways

AMERICAN HIGHWAY PRACTICE: Volume II. —By L. I. Hewes, 492 pp. John Wiley & Sons, New York, Chapman & Hall, London. $6. (Volume I, $5.)

Taking up where Volume I left off, this volume of Mr. Hewes' text on American highway practice is given over to the design and construction of the higher types of highway construction, penetration macadam, sheet asphalt, asphaltic, bituminous and portland-cement concretes and brick pavements. Treatment of these higher types in a separate volume has made it possible to give more attention to the theory that lies back of current designs. Especially valuable is the author's sifting of the extensive theoretical studies of the many aspects of highway design and his analysis of their results in the light of his long practical experience with the Public Roads Administration.

About one-third of the book is given over to descriptions of the miscellaneous structures employed in highway work such as small bridges, grade-separation structures, culverts, curbs and catchbasins.

Volume I of this text was given over to the general principles of highway location, design and construction and to the design and construction of low-cost roads. Taken together, the two books give a concise yet comprehensive picture of highway design and construction as practiced today.

INTRODUCTION TO HIGHWAY ENGINEERING—Fourth Edition. By John H. Bateman. 456 pp. John Wiley & Sons, New York; Chapman & Hall, London. $4.

The fourth edition of Prof. Bateman's well-known textbook has been revised and expanded somewhat to add new material on soil-cement roads, on asphalt pavements and on the design of concrete pavements. However, like most texts that run into several editions, this one shows evidence of needing a much more thorough modernization, especially in the matter of illustrations and bibliography. Notably absent is any reference to the special studies of the American Association of State Highway Officials on highway types, intersections and two and three-lane roads.

Miscellaneous Notes on Booklets and Reprints

SABOTAGE AND ITS PREVENTION is the subject of War Bibliography No. 1 issued by the Bureau of Public Administration, University of California, Berkeley, Cal. 35c.

ARTICLES ON THE DELAWARE WATER SUPPLY SYSTEM published recently in *Engineering News-Record* have been reprinted in pamphlet form by the Board of Water Supply of New York City. Copies can be obtained for 50c. from Charles O'Neill, Room 1138, 346 Broadway, New York City.

WARTIME ROAD PROBLEMS are to be covered by a series of pamphlets issued by the Highway Research Board, 2101 Constitution Ave., Washington, D. C., to provide quick dissemination of information on how best to meet those problems. The first of the pamphlets, published under the general heading of "Wartime Road Problems," is entitled "No. 1, Curing Concrete Pavements Under Wartime Restrictions on Critical Materials."

ASPHALT PAVEMENT DESIGN as affected by transportation shortages is reviewed in a pamphlet of the Asphalt Institute, 801 Second Ave., New York, N. Y. Included is a specification for constructing mechanically stabilized and prime-coated sub-base for asphalt pavements or for surface treatment developed jointly by the Corps of Engineers, Civil Aeronautics Administration, and the Public Roads Administration. Copies can be obtained on application to the institute.

THE PLACE OF HIGHWAY TRANSPORTATION in the current war program is set forth strikingly in a display booklet just issued by the National Highway Users Conference, National Press Building, Washington, D. C. The booklet is subdivided into four main parts containing statistics on highways, on the number of vehicles using

(*Continued on p.* 125)

Prescription for Victory!
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MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

ONLY MINOR price changes are on record in the construction material and labor list for September. Portland cement is up 6c. per barrel in New York. Crushed stone is 35 and 30c. per ton higher in Montreal, and ready-mixed concrete increased 65c. per cubic yard there.

Paving asphalt in drums is up $1.00 per ton, and cutback asphalt and road oils are up 0.5c. per gallon in St. Louis.

Structural steel shapes are up 10c. per 100-lb. and reinforcing bars are 25c. per 100-lb. higher in Montreal.

Lumber prices are unchanged from a month ago, except that in New York 6x12-in. and 12x12-in. Douglas fir timbers are likely to vary from $75.00 to $95.00 per M ft. board measure, depending on the grade available. Previously, the price was $75.00 per M.

Structural clay tile prices rose on all sizes in Montreal, and lime climbed there also. Common brick is $1.00 per M higher in Kansas City, and up 50c. in New York.

The structural ironworkers' rate is 10c. per hour higher in Philadelphia and is now $1.90. This is the only change in the construction labor rate list for September.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT Per bbl., carload lots, including 40c per bbl. for bags, cash discount not deducted			SAND AND GRAVEL Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE Ready Mixed 1:2:4, 50 c.y. or more, delivered
	Cloth Bags *a*	Paper Bags	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	
Atlanta	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$8.04
Baltimore	2.36	2.11	1.91	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	7.25
Birmingham	2.50	2.25	....	1.75	1.75	1.50	.85	1.00	.90	1.15	5.80
Boston	2.75*b*	2.50*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	7.25*m*
Chicago	2.70	2.45	2.30	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	6.60
Cleveland	2.39	2.14	....	1.50*i*	1.50*i*	1.30*i*	1.75*i*	1.75*i*	1.75*i*	1.75*i*	7.30*i*
Dallas	2.52	2.27	2.07	1.75*p*	2.00*p*	1.75*p*	1.69*p*	1.84*p*	....	....	6.20
Denver	3.08	2.88	....	1.20	1.40	.90	....	....	....	....	7.25
Detroit	2.40	2.15	1.95	2.25	2.00	1.10	2.25	2.25	2.00‡	2.00‡	6.50
Kansas City	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	7.50*n*
Los Angeles	2.80*v*	2.20*v*	....	1.20	1.20	1.15	1.20*f*	1.20*f*	....	....	6.65
Minneapolis	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	7.35*j*
Montreal	....	1.95*rs*	1.79*rs*	....	....	1.25‡*t*	1.20‡*ct*	1.30‡*ct*	....	....	7.90*ls*
New Orleans	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	9.25
New York	2.66‡	2.41‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	7.25*k*
Philadelphia	2.32	2.07	1.87	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	8.20
Pittsburgh	2.44	2.19	1.99	1.40‡	1.40‡	1.70‡	2.25‡	2.25‡	1.50	1.50	8.25
St. Louis	2.80	2.52	....	1.50‡	1.50‡	1.25/1.50‡	1.10*h*	1.10*h*	.75*g*	.75*g*	8.00
San Francisco	....*u*	2.21	1.81	1.36	1.36	1.36	1.46	1.46	....	....	7.55
Seattle	2.95*o*	2.75*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount of 25c per. c. y. for cash in 10 days. *l* Up to 200 cu. yd. *m* 50c. off for cash *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u*. Price withdrawn. *v* 20c. per bbl. discount · 20c. allowed for returnable cloth bag.

CASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn	$1.80	$1.75
Dallas, Tex. (Inc. 10c. tax)	1.85	1.80	Limedale, Ind	1.70	1.65	Steelton, Minn	1.80	1.75
Hannibal, Mo	1.70	1.65	Norfolk, Va	1.75	1.70	Universal, Pa	1.65	1.60
Hudson, N. Y	1.75	1.70	Northampton, Pa	1.55	1.50	Waco, Tex. (Plus 10c. tax in Tex.)	1.75	1.70
Independence, Kans	1.70	1.65	North Birmingham, Ala	1.70	1.65	Montreal (8% sales tax incl.)	1.68	1.67

PAVING BRICK, BLOCKS, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICKS AND BLOCKS			PAVING ASPHALT Per ton, less than 80 penetration		ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration		CUTBACK ASPHALT Per ton		ROAD OILS Per gal.	ASPHALT EMULSION (Quick-breaking) Per gal.	
	Granite per M. lots of 50,000 4x4x8 in.	Brick per M. 3x4x8½ in. carload lots	Wood per sq. yd. 3½ n. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$18.40*e*	$24.62*e*	$0.0787*e*	$0.1309*e*	$0.0826*he*	$0.1348*h*	$0.0676*e*	$0.0826	$0.1348
Baltimore	150.00‡	45.00‡	3.00	15.00	21.00	.06	.09	13.00	23.00	.065	.07	.14
Birmingham	......	32.00*j*	....	17.95	.....†	.0747	......†	.0834*h*	......†	.065	.09	......†
Boston	85.00	55.00	3.75	14.00	20.00	.06	.09	.065*h*	.115*h*	.065	.09‡	.12‡
Chicago	150.00	55.00	2.20*d*	14.80	20.80	13.00*g*	18.50*g*	.0625*h*	.15*h*	.05	.08	.12/.14
Cincinnati	112.00	37.50	....	16.40	.....	.085	......	12.25	......	.07	.085	......
Cleveland	110.00	38.50	2.25	20.00	25.00	.09	.155	.10*h*	15.00	.07	.11	.15
Dallas	......	36.00	....	13.25	20.30	.06	.11‡	16.00	24.80	.06	.05/.07	.07/.09
Denver	......	27.50	....	.....	.....	......	......	......	......	......	......	......
Detroit	......	37.50	....	15.10*f*	22.60*f*	.0725	.1262	15.10	21.10	.067	.0725	.1262
Kansas City	......	40.00	....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
Los Angeles	......	50.00	....	6.50*b*	15.00	6.50*bg*	15.00*bg*	5.50*b*	......	.0192	.0525	.1125
Minneapolis	......	.....	1.87*d*	.....	27.70	......	.126	......	32.64	......	......	......
Montreal	......	.....	....	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	.188*k*
New Orleans	......	.....	....	13.00*a*	19.00*a*	.055	.085	.06*h*	.09*h*	......	.078	......
New York	......	.....	....	16.40	23.50	.064	.124	.07*h*	.13*h*	.067	.0725	.1225
Philadelphia	130.00	56.50	3.96	14.00	.....	.055	......	.065*h*	.....	.055	.065	.....
Pittsburgh	135.00	38.75	....	.....	.....	......	......	......	......	......	......	......
St. Louis	......	37.00	....	15.00	21.00	14.00*g*	20.00*g*	.065*h*	.11*h*	.05	.09	.125
San Francisco	......	70.00	....	9.50	18.00	9.50*g*	18.00*g*	10.00	17.50	9.50*g*	.0525	.1125
Seattle	......	60.00*c*	....	9.50*i*	25.85	....	25.10*g*	10.00*i*	......	9.50*i*	.0575*i*	.0808

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3¾x8½ in. *k* Tax included. † Available on priority only and quoted specially.

DRY BRAIDED FIBREX*

Used Like Braided Jute
Will Not Breed Bacteria

Sanitary

PACKING USED IN JOINTING BELL
AND SPIGOT PIPE FOR WATER MAINS
SEWER MAINS AND SOIL PIPE

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ *FIBREX
PAT. APPLIED FOR

FIBREX is a paper packing treated with a special water repellent, which keeps the FIBREX sterile and prevents it from disintegrating. It has a hard twisted core with a basket weave covering, and packs in a joint exactly the same as dry braided jute.

FIBREX is lighter in weight than jute and only 70% of the usual number of pounds is required. The cost per pound is approximately the same for both FIBREX and jute, resultant savings in using FIBREX are approximately 30%.

FIBREX is shipped on 35 pound reels, and comes in $\frac{3}{8}$", $\frac{1}{2}$" and $\frac{5}{8}$".

FIBREX is a superior packing and already hundreds of pounds are in service on water lines throughout the country. It has the approval of the War Department at Washington, Area Engineer Offices of the War Department, State Departments of Public Health and numerous Water Departments.

★ *Protect your Mains-Use a Sanitary Packing* ★

See page 144 for the complete story on Hydro-Tite—the dependable self-caulking compound.

HYDRAULIC DEVELOPMENT CORPORATION
Main Sales Office: 50 CHURCH STREET, New York, N. Y.
Works: WEST MEDFORD STATION, Boston, Mass.

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¾-in. billet *b*	RIVETS ¾-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *c*	Tie Plates	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.75
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.75
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	.....	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates, alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per c.l.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¾ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq.yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 s.f., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd.	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.39	$2.39	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	......	.10	24.00	26.00	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701	....
Boston	3.85	3.51	3.36	$20 C.L.	.10	18.50	29.50	1.76	1.31	.1656	2.70
Chicago	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.53*cd*	2.53*cd*	......	.05	19.50	21.50	1.66	1.25	.1566	...
Cleveland	2.10*a*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	....
Dallas	4.25	3.17	3.17	......	.....	27.50	25.50	1.93	1.42	.1827	....
Denver	4.35	3.95	3.85	......	.....	26.50	28.50	1.97	1.45	.1863	....
Detroit	3.65‡	2.34	2.24	......	.10	23.00	25.50	1.68	1.26	.1584	2.66
Kansas City	4.00	2.64*cd*	2.64*cd*	.0	.05	19.60	23.60	1.78	1.33	.1682	2.89
Los Angeles	3.65*f*	3.32	3.32	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.80‡	2.75	2.75	.0	.10	25.00	27.00	1.80	1.34	.1701	2.75*d*
Montreal	4.00*i*	2.90*i*	2.80*i*	......	.....	26.00*hij*	33.00*hij*	2.56*i*	3.14*i*	.268*i*	....
New Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1719	2.875
New York	3.75	2.76*c*	2.76*c*	......	.15	17.50	19.50	1.76	1.32	.1665	2.74
Philadelphia	3.65	3.85	....	......	.....	19.50	21.50	1.71	1.28	.1611	2.74
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503	2.40
St. Louis	3.69	2.40	2.40	.0	.05	28.00	34.00	1.69	1.27	.1602	2.70
San Francisco	4.35	2.825	.....	.02½	.10	21.00	24.50	1.93	1.42	.1827	3.85
Seattle	2.75*e*	2.50*e*	.....	......	.....	34.50	38.50	1.93	1.42	.1827	2.95*ej*

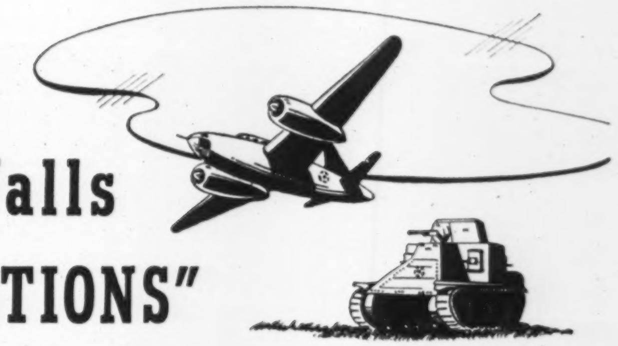
‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* F.o.b. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between new billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *j* August price; not on market.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Butt Weld Black %	Galv. %	3½ to 6 in.; Lap Weld Black %	Galv. %
Atlanta	$49.40	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	51.2
Baltimore	52.80	.36	.60	2.50	7.25	150.00	200.00	.50	1.75	65.5	57.5	63.0	54.5
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	51.2
Boston	60.00	.26	.463	2.07	5.85	140.00	......	.70	....	64.1	56.1	61.6	53.1
Chicago	55.50	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	62.2	54.2	59.7	51.2
Cincinnati	52.70	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	65.9	57.9	63.4	54.9
Cleveland	54.24	.203	.3915	1.665	5.125	81.00	125.00	.30	1.60	67.8	59.8	65.3	56.8
Dallas	58.20	.31	.55	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	60.60	.29†	.52†	2.16†	....	130.00	240.00	....	....	58.4	50.4	55.7	47.2
Detroit	54.24	.245	.4725	1.935	5.14	82.50	131.25	.35	1.50	66.3	58.3	63.8	55.3
Kansas City	59.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	62.9	54.9	60.0	51.5
Los Angeles	68.40	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	59.6	51.6	57.0	48.6
Minneapolis	59.00	.275†	.495†	1.98†	5.14†	......	......	.90	2.10	64.2	56.2	60.7	52.2
Montreal	60.00	.85	1.50	5.25	8.50*e*	45.00*m*	64.00*m*	.48*m*	1.92*m*	....	....	....	....
New Orleans	51.38	.26	.48	1.69	.....	150.00	220.00	.40	2.10	62.4	54.4	58.8	50.3
New York	52.20	.455	.8775	2.925	7.65	......	......	.60	1.40	64.9	56.8	62.4	53.9
Philadelphia	.....	.28	.54	2.30	6.75	150.00	225.00	.45	1.75	56.4	42.6	53.3	38.9
Pittsburgh	55.60	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	54.5*i*
St. Louis	52.48	.28	.504	2.016	4.50	85.00	220.00	.90*j*	1.60*k*	56.4	42.6	52.5	38.1
San Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.50	192.50	.58	3.30	46.0	32.0	42.0	27.0
Seattle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51*f*	1.44*f*	....	....	....	....

‡ Delivered. † F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ½ in., 8½c.; ¾ in., 11½c ; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76–37. *k* Reinforced; spec. C 75–37. *l* Plus sales tax. *m* Tax included.

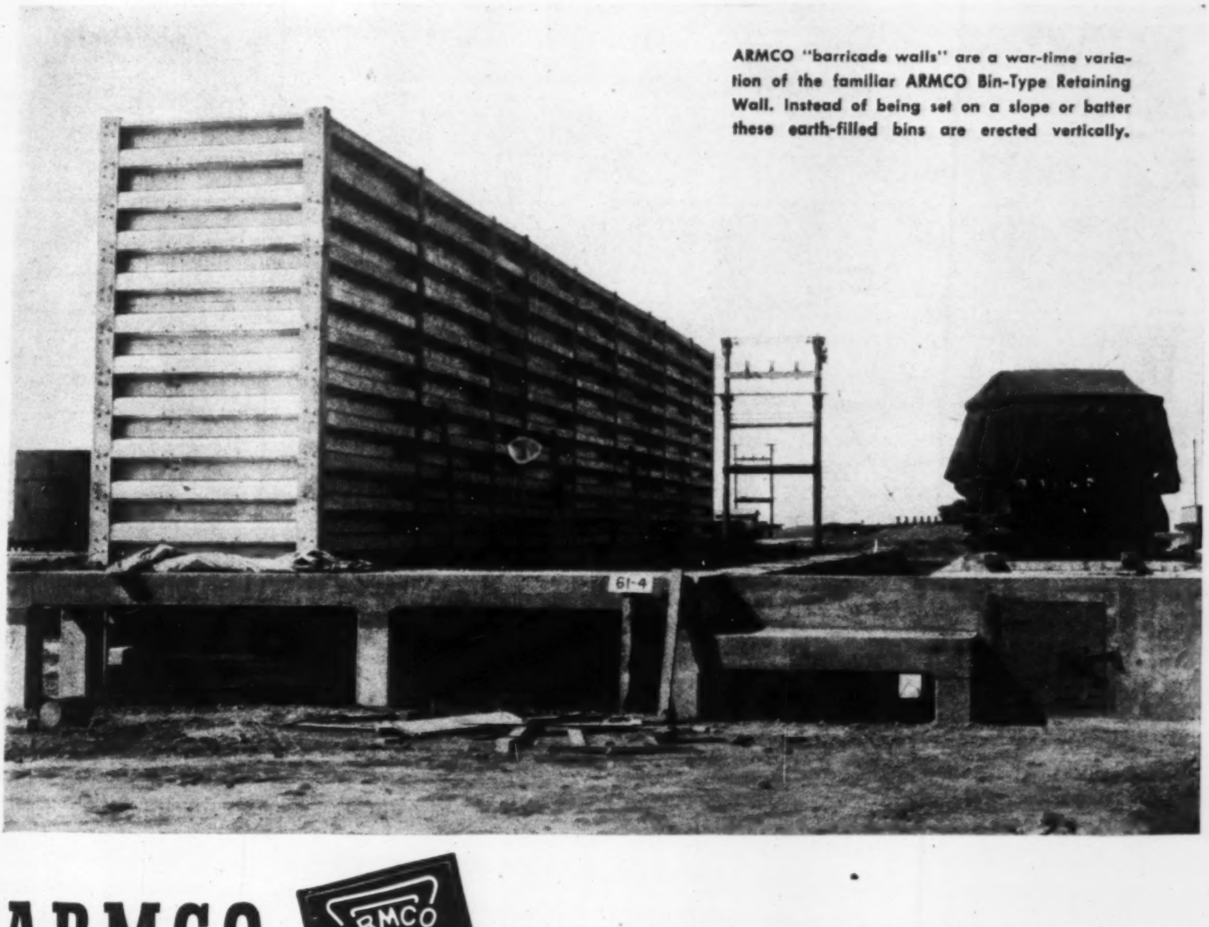
Metal Retaining Walls TAKE "BATTLE STATIONS"



ARMCO Bin-Type Walls have joined up for the duration. They are standing guard to minimize the effects of blasts at vital munition and ordnance plants, storage magazines or wherever else high explosives are handled in non-combat areas.

These ARMCO "barricade walls" have many of the advantages of their peace-time counterparts. They can be ready for use in a few days' time. Erection and backfilling are quickly done by unskilled labor and no expensive equipment is needed. On the economy side, ARMCO Walls can be easily salvaged or moved to a new site. The units are nestable and require relatively little space for transportation or storage.

Keep ARMCO Bin-Type Walls in mind for future use as well as important war construction. You'll find them a ready solution for unstable slopes, right-of-way, stream erosion and similar problems. Armco Drainage Products Assn., 925 Curtis St., Middletown, Ohio.



ARMCO "barricade walls" are a war-time variation of the familiar ARMCO Bin-Type Retaining Wall. Instead of being set on a slope or batter these earth-filled bins are erected vertically.

ARMCO ARMCO **BIN-TYPE RETAINING WALLS**

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face)

All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment (See note for base price)	
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	5/8"	3/4"
Atlanta	**$29.00**	**$28.00**	**$29.00**	**$27.00**	**$28.00**	**$29.50**	**$40.00**	......	......	$60.00	$70.00	$17.90	$21.85
Baltimore	**40.00**	**41.00**	**42.00**	**40.00**	**40.00**	**44.00**	**56.00**	......	......	95.00	98.00	18.25	22.25
	47.00	*47.00*	*48.00*	*48.00*	*49.00*	*52.00*	*65.00*	*$70.00*	*$75.00*	......	......	......	......
Birmingham	**34.50**	**34.50**	**32.00**	**32.00**	**32.00**	**34.00**	**53.00**	**53.00**	**56.00**	......	......	17.35	21.15
[1]	37.50	37.50	37.00	37.00	37.00	43.00	65.00	......	......	67.50	70.00	......	......
Boston ‡*	70.00[2]	70.00[2]	60.00[8]	60.00[3]	87.00[1]	100.00[1]	115.00[1]	......	......	115.00	130.00	18.25	22.25
‡*	*55.00*	*55.00*	*60.00*	*65.00*	*65.00*	*80.00*	*85.00*	*85.00*	*85.00*	......	......	......	......
Chicago	**43.00**	**44.00**	**43.00**	**43.00**	**44.00**	**46.00**	**53.00**	......	......	90.00	100.00	14.60	17.80
	46.00	*46.00*	*46.00*	*44.00*	*46.00*	*48.00*	*50.00*	*85.00*	*85.00*	......	......	......	......
Cincinnati	**41.00**	**42.50**	**39.00**	**40.50**	**42.00**	**43.00**	**53.00**	......	......	65.00	68.00	17.35	21.15
	......	......	......	......	......	......	*55.50*	*55.50*	*55.50*	......	......	......	......
Cleveland	**42.50**	**43.50**	**41.50**	**43.50**	**45.00**	**47.00**	**53.00**	57.00	57.00	90.00	93.00	17.75	21.60
Dallas e	**39.50**	**40.50**	**39.50**	**38.00**	**38.50**	**39.50**	**53.00**	**53.00**	**53.00**	78.00	83.00	14.60	17.80
Denver ‡	54.00[4]	52.00[4]	55.00[4]	55.00[4]	55.00[4]	56.00[4]	59.00[4]	*73.00*	*79.00*	......	......	10.45	12.70
Detroit	**46.00**	**46.00**	**46.00**	**46.00**	**46.00**	**48.00**	**53.00**	......	......	53.00	61.50	17.35	21.15
	......	......	......	......	......	*51.50*	*54.00*	*60.00*	*60.00*	......	......	......	......
Kansas City	**50.00**	**55.00**	**52.00**	**52.00**	**52.00**	**55.00**	**65.00**	......	......	75.00	85.00	12.60	15.40
	50.00	*55.00*	*52.00*	*52.00*	*52.00*	*55.00*	*65.00*	*80.00*	*80.00*	......	......	......	......
Los Angeles a	*55.00*	*55.00*	*53.00*	*53.00*	*51.00*	*51.00*	*57.00*	*65.00*	*56.00*	......	......	9.90*gh*	12.05*gh*
Minneapolis ‡b	49.00[8]	49.00[8]	......	......	......	......	......	......	......	......	......	12.60	15.40
‡	*53.00*	*53.00*	*53.00*	*52.00*	*52.00*	*53.00*	*59.00*	*61.00*	*61.00*	......	......	......	......
Montreal †[7]	*43.00*	*46.00*	*42.00*	*45.00*	*47.00*	*54.00*	......	......	......	200.00	200.00	......	......
	42.50	*42.50*	*45.25*	*47.25*	*48.25*	*46.75*	*50.75*	*50.75*	*50.75*	......	......	......	......
New Orleans	**31.50**	**31.50**	**33.75**	**31.75**	**34.00**	**35.00**	**48.00**	......	......	69.00	69.00	14.60	17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*32.00*	*33.00*	......	......	......	......	......	......
New York ‡	**48.00**	**49.00**	**49.00**	**50.00**	**51.00**	**54.00**	**62.00**	......	......	120.00*f*	125.00*f*	18.35	22.25
‡	......	......	*65.00*	*65.00*	*65.00*	*65.00*	*67.50*	*75.00*	*95.00*	......	......	......	......
Philadelphia	**46.00**	**47.00**	**46.00**	**46.00**	**47.00**	**50.00**	**52.00**	......	......	80.00	85.00	18.25	22.25
	54.00	*54.00*	*65.00*	*65.00*	*65.00*	*65.00*	*67.50*	*75.00*	*75.00*	......	......	......	......
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	......	......	......	......	18.10	22.05
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	......	......	......	......
St. Louis ‡c	**47.50**	**47.50**	**45.00**	**43.00**	**45.00**	**49.00**	**62.50**	*71.00*	*71.00*	79.00	70.00	14.60	17.80
San Francisco d	*35.50*	*35.50*	*37.00*	*37.00*	*36.50*	*36.50*	*40.50*	*49.50*	*49.50*	......	......	7.30*g*	8.90*g*
Seattle	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*40.00*	*40.00*	*40.00*	......	......	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [6] Western Pine, No. 3 Common. [7] Spruce. [8] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax. * Prices for truck delivery; no longer quoting carload lots f. o. b. city.

Note: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on 5/8", $86.50; on 3/4", $95.30; price includes oiling and sealing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment. *h* 50,000 lb. minimum.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness		EXPLOSIVES Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*
	A quality	B quality	
Atlanta	75%	75%	$0.15
Baltimore	79%	80%	.15
Birmingham	76%	76%	.105
Boston	77%	78%	.15
Chicago	77%	77%	.15
Cincinnati	77–10%	77–10%	.15
Cleveland	77%	77%	.19
Dallas	76%	76%	.1625
Denver	76%	76%	.155*e*
Detroit	77%	77%	.15
Kansas City	76–10%	76–10%	.155
Los Angeles	86%*d*	88%*d*	.1575
Minneapolis	77%	77%	.155
Montreal	40–5%‡	47%‡	.1675†
New Orleans	70%	75%	.16
New York	81%	82%	.22*f*
Philadelphia	78%	79%	.15
Pittsburgh	79%	79%	.1225
St. Louis	76–10%	76–10%	.155
San Francisco	66–15%	73–15%	.155
Seattle	75%	75%	.1575†

Price of 60% Ammonia Gelatin in $0.01 per lb. higher than 40%

a Disc. from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Plus sales tax.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip. † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb.
(except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine.	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.11 –.1225	.135 –.1525‡	.155 –.1725‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1125	.135 –.1425	.155 –.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, pine, with bark on, f.o.b. New York; delivered from barge 1½ to 2c. per ft. additional:

			Short Leaf	
Dimensions	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.23	$0.26
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.26	.28
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.27	.29
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.28	.29
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.31	.33
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.40	.44
14 in.—2 ft. from butt	5 in.	85 to 89 ft.	.45	.482

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8'		7"x9"x8'6"	
		Untr.	Tr.	Untr.	Tr.
Boston	Oak	$1.30	....	$1.80	....
	Pine	1.60	$2.40*a*	2.40	$3.40*a*
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.86
	Mixed Oak	1.71	2.59	2.20	3.25
Birmingham	White Oak	1.00	1.60*a*	1.30	2.25*a*
	Southern Pine	....	....	....	....
Chicago	Red Oak	....	2.40*a*	....	3.00*a*
	Southern Pine	....	....	....	....
Los Angeles	Douglas Fir	1.10	1.75*a*	1.60	2.50*a*
Philadelphia	Red Oak	....	2.10*a*	....	3.25*a*
St. Louis	White Oak	1.65	....	1.90	....
	Red Oak	1.55	2.15*a*	1.90	2.70*a*
	Sap Pine or Cypress	1.35	....	1.70	....
San Francisco	Douglas Fir	1.15*bef*	....	....	3.00*caf*
Montreal	Birch or Maple	.85	.95	....†	....†

Tr.—Treated; Untr.—Untreated. *a* Creosoted. *b* 6" x 8 x 8'6". *c* Empty cell. *d* Zinc. *e* Green. *f* F. o. b. cars. † Out of market.

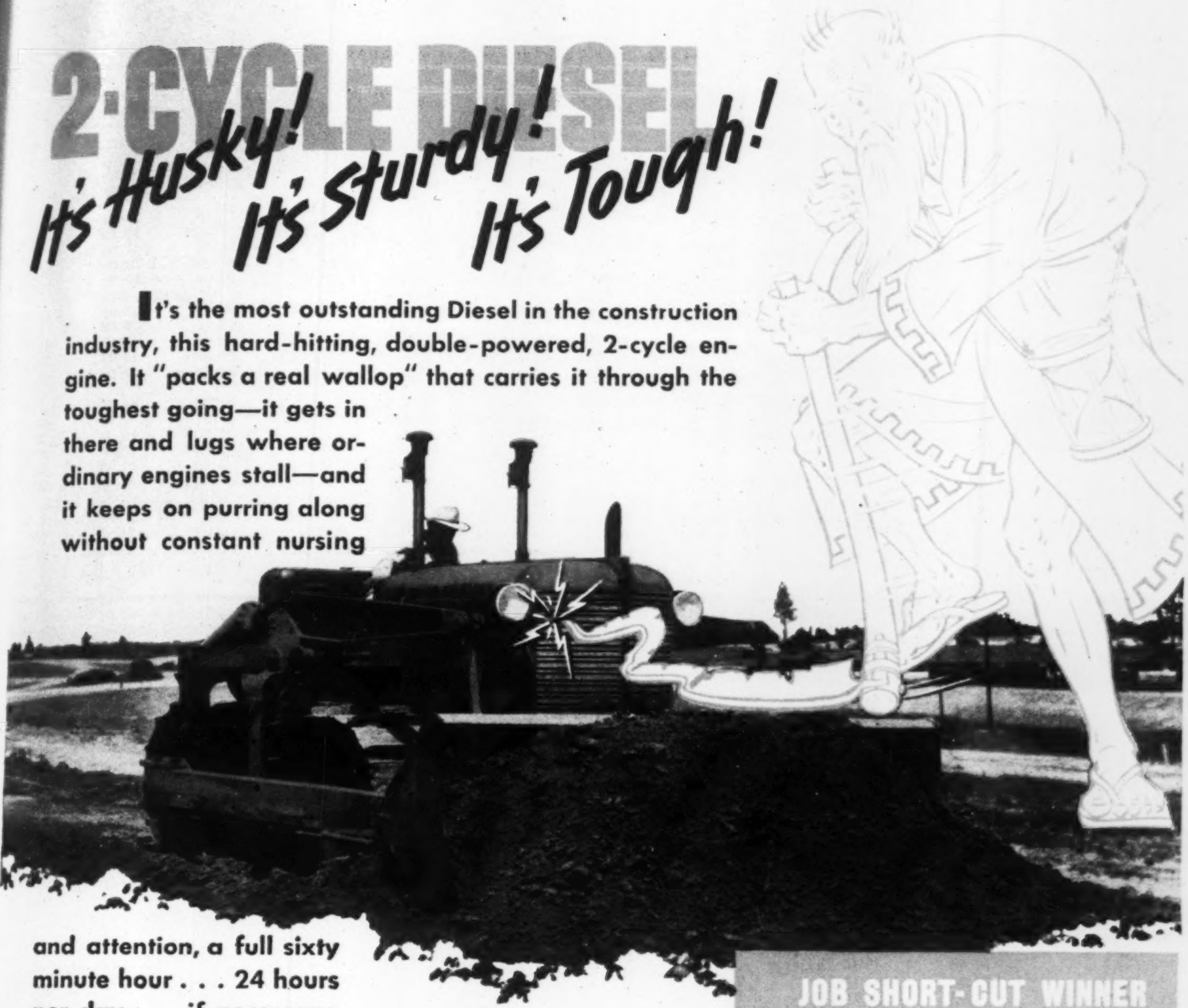
CHEMICALS

Water, sewage treatment road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.25– 3.10
Chlorine cylinders, liquid, per lb. delivered	0525
Calcium chloride, 77–80%, flaked, in 100-lb. paper bags, delivered, per ton	18.50–35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb.	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.15
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00–25.00
Sulphate of copper, in bbl., per 100-lb	5.15– 5.50

2-CYCLE DIESEL

It's Husky! It's Sturdy! It's Tough!



It's the most outstanding Diesel in the construction industry, this hard-hitting, double-powered, 2-cycle engine. It "packs a real wallop" that carries it through the toughest going—it gets in there and lugs where ordinary engines stall—and it keeps on purring along without constant nursing and attention, a full sixty minute hour . . . 24 hours per day . . . if necessary.

Service records indicate thousands of hours of operation without overhauls or major repairs on tough, three shift jobs. That's the kind of service Allis-Chalmers tractor owners are getting from their 2-Cycle Diesels. It's the kind of performance that gets jobs finished on time and at less cost — the kind of performance you've always wanted in a tractor engine — the kind of performance only a 2-Cycle Diesel can give you.

If you are not already a 2-Cycle Diesel owner, it will pay you to check up on this modern power. Be prepared for the future. Write for complete information.

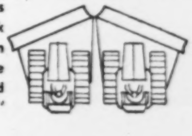
ALLIS-CHALMERS
TRACTOR DIVISION, MILWAUKEE, U.S.A.

2-Cycle
THE MODERN
DIESEL POWER

JOB SHORT-CUT WINNER

$5 to Fred Goett, 841 E. 67th St., Seattle, Washington, for the Following Short-cut Method:

"One winter we had a pile of muck to get off the grade. It was too deep to get a tractor through it. All we could do was push it up a little and that made it worse. So we took two A-C's, one HD-10 and an LO, both with angle dozers. We angled the blades and worked the machines side by side. The blades were angled so they formed a point (illustration). The two angle dozers went through the muck pile and worked it down to solid footing so the other dozers could get rid of it. It worked good."



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You, too, can win $5 and at the same time help the war effort! Send in your Job Short-Cut suggestions and ideas on How To Make Tractors and Graders Last Longer. Allis-Chalmers will pay $5 for each suggestion accepted for publication in future advertisements.

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE — PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity. Common backing	Straight hard	LIME Per ton, Hydrated finishing	In paper, Common hydrated	Carload lot, Pulverized or lump
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$13.50	$18.04	$26.54	$15.04	$15.04
Baltimore	84.00	90.00	170.00	200.00	260.00	320.00	14.00k	17.00k	19.00	13.00	2.50m
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.61	2.25lo
Boston	89.35a	93.30a	178.70a	202.50	271.80	308.20	18.00i	21.00i	20.00	14.00	17.00
Chicago	72.00	77.00	145.00	197.00	243.00	278.00	12.50	13.50	17.00	15.00	12.50
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	17.50	17.50	15.40	12.90	....
Cleveland	60.00	64.00	120.00	144.00	193.00	221.00	17.00	17.00	14.50j	13.25	3.00jm
Dallas	62.50	67.00	135.00	162.00	212.50	263.00	13.50i	15.00i	19.00	15.00	.95n
Denver	84.80	94.40	152.70	178.20	212.00	227.90	13.50	17.50	30.00j	22.00j	24.00j
Detroit	76.90	81.50	152.80	201.00	262.00	310.00e	17.50	18.00	16.60	14.00	14.60
Kansas City	67.00	69.00	89.00c	128.00	163.00	189.00	15.50	16.50	19.32	13.00	10.92
Los Angeles	73.50†r	89.50†r	128.00c†r	210.00†r	368.00†r	460.00†r	13.50	15.00	16.50	17.50	17.50
Minneapolis	81.00b	86.40b	146.90b	......	177.00b	246.00b	13.60	15.60g	21.00	16.00	19.00
Montreal	99.10a	105.05a	154.75a	104.65at	154.75au	155.25	22.00†u	27.25†u	24.60u	18.00u	12.00uv
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	78.40	83.60	115.00c	193.30h	238.80h	295.60h	15.00	.....	20.00	14.00	17.00
Philadelphia	90.00	97.70	183.20	197.10	243.20	301.10	17.00	20.00	15.50	8.55	10.55
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.55m
St. Louis	67.00	95.00	130.00	190.00	244.00	29[illegible]00	18.00	17.00	22.00	18.00	18.00
San Francisco	84.00	94.50	225.00	......	......	......	17.50	22.00	20.00	20.00	16.40
Seattle	105.00	115.00	210.00	......	......	......	19.50f	20.50f	20.00s	20.00s	20.00s

† F.o.b. a Smooth. b Carload lots delivered to job. c 6x12x12 in. d Not load bearing. e 48 lb. tile. f Less $1.00, ½ cash 15 days, balance 30 days. g Selected common. h F.o.b. Perth Amboy, N. J. i 50c. per M. off for cash. j LCL. k $1.00 discount if paid in 10 days. l Lump. m Per bbl., 180 lb. n Per sack 100 lb. o Per bbl., 200 lb. p 280 lb. bag. r 5% discount 10 days. s 2% discount for cash. t 5¼x8x12. u Plus 8% sales tax. v August price; none later.

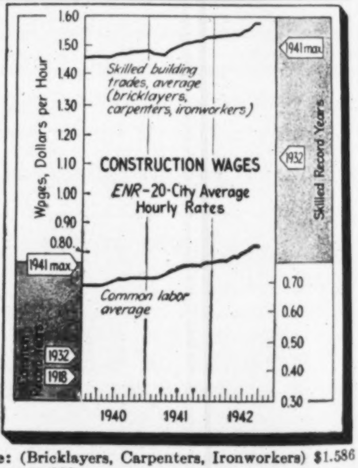
PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry a	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum b	Ferric Oxide d	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85–90 lb. per sq.	Asphalt felt, per 100 lb.	T[illegible] felt, per 100 lb.	Asphalt coating per gal	Tar pitch 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	30.00
Birmingham	10.25	14.125	2.35	3.50r	1.98r	2.04	1.97	1.97	.32	28.35
Boston	10.00	13.75	1.55	....	2.25	2.12‡	1.72h‡	1.72h‡	.50‡	20.00‡
Chicago	10.00	13.75	2.11	2.63	1.72	1.75hf	1.66hf	1.82hf	.33f	23.00f
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.40	2.39h	2.39h	.36	21.00
Cleveland	10.00	13.75	2.10	4.80	1.95	1.93	1.83h	1.83h	.35	29.00
Dallas	10.00	14.50	1.88	2.11n	....	2.30h	2.25h	2.25k	.35	39.00
Denver	10.50	14.25	1.65	....	.27l	2.45	3.15	3.15	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.40	2.50	2.50	.35	22.00
Kansas City	10.00	13.875	2.39g	2.55gr	2.16gn	2.10	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	....
Minneapolis	10.00	13.875	....	....	....	1.75i	1.66hi	1.66hi	.32	23.00
Montreal	9.25	6.25	2.85p	4.70p	2.70p	2.85	2.58	2.07	.63	1.85k
New York	10.00	13.75	2.05	2.55	1.64	1.66	1.58h	1.58h	.26	25.00
Philadelphia	10.00	13.75	....	....	....	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.94h	1.94h	.34	26.00
St. Louis	10.00	13.75	2.28	2.89	1.96	2.04	1.66	1.66	.31	22.00
San Francisco	10.25	14.00	1.80	2.75n	1.35/2.35	1.71	2.40	2.40	.33	19.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16h	....	.35	26.50j

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. a Red lead prices change frequently due to pig lead price changes. b U. S. War Dept. Spec. 3–49A. c ASTM Spec. D266–31. d 80% minimum ferric oxide. e Subject to 25% discount. f Distributors' price to contractors. g 5 gal. can h Per roll, 65 lb. i Minneapolis and vicinity. j Asphalt pitch. k Per 100 lb. l Per lb. m Per bbl. n May, 1941 price, no later quotation available. p Plus 8% sales tax. r Not available, except on priority rating; then quoted specially.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Common Labor Heavy Const.
Atlanta	$1.375	$1.00	$1.375	$1.00/1.25	$1.25	$0.40	$0.50
Baltimore	1.625	1.375	1.65	1.65	1.50	.70	.70
Birmingham	1.75	1.125/1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.875	1.667	.80/1.00	.80/1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.75	1.50	1.625	1.40/1.55	1.625	.80	.80
Cleveland	1.75	1.50	1.75	1.75	1.75	1.00	1.00
Dallas	1.625	1.25	1.50	1.25/1.50	1.625	.60	.75/1.00
Denver	1.65b	1.43b	1.43b	1.43b	1.51b	.718b	.718b
Detroit	1.675	1.50	1.75	1.675/1.75	1.675	.90	.90
Kansas City	1.65	1.50	1.625	1.625	1.65	.90	.55
Los Angeles	1.50	1.50	1.50	1.50	1.667	.75	.75
Minneapolis	1.50	1.375	1.50	1.40	1.50e	.925	.925
New Orleans	1.50	1.25	1.50	1.375	1.375	.65	.65
New York	2.00b	1.85b*	2.00	2.00b	2.00c	1.031	.95
Philadelphia	1.90	1.50	1.90	2.00	2.00	.825	.825
Pittsburgh	1.90	1.50	1.75	1.5625/1.625	1.75	.80	.70
St. Louis	1.75	1.50	1.75	2.00	1.75	.95	.95
San Francisco	1.75c	1.375	1.60	1.50	1.667c	.875	.875
Seattle	1.715	1.415	1.615	1.565	1.715	1.015	1.10
Montreal	.965	.855	.90	.80	.945	.505	.505



ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) $1.586

ENR Common Average: $0.823

b 7 hr. day. c 6 hr. day. d 35 hr. wk. e 30 hr. wk. *Negotiating now for increased rate.

Engineered Construction and Simplex CABLES!

War as carried on today, needs engineered construction in greater volume than ever before. Sites and buildings for military training and housing; yards and plants to produce ships and munitions; highways, railroads, bridges and airports to handle more and faster transportation.

In all of these construction activities electricity must be distributed for light, power and communication. And after the construction is completed, the finished product usually is more or less electrically equipped and operated; every camp has its lighting and communication systems; every yard and plant has its electrically operated tools and machines; every railroad has its signal system and every airport its floodlighting.

There is a size and type of Simplex insulated wire and cable to meet every requirement of electrical distribution and engineered construction and as made today they conform to the restrictions and regulations of the War Production Board. Because of scarcity of rubber, copper and other critical materials they cannot be made for purely commercial uses but they are building up excellent records of performance on essential war work.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge, Mass.

Simplex

WIRES and CABLES

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

AIRPORT CONSTRUCTION NEW YORK

OWNER. U. S. Dept. of Commerce, Civil Aeronautics Administration, La Guardia Field, New York, N. Y.

PROJECT: Construction of an airport in Chautauqua County, New York, consisting of clearing, grubbing, grading, draining, paving and lighting facilities. Includes two runways 150 feet wide and 4,000 feet long, together with taxiways, etc.

CONDITIONS: Contractor to furnish all materials required for completion of clearing and paving schedules. On the lighting contract, the government is to furnish the beacon tower, cabinets, rotating beacons, obstruction light fittings, 1- and 2-conductor parkway cables, wind cone assembly, splice boxes, film cutouts, A. & J. boxes, strip lights, and range lights. Project has A-1-e priority rating. Railway and highway transportation facilities available near site of work. Wage rates are: skilled labor, $1.00 to $1.75 per hour; semi-skilled, 65c. to $1.15; common, 75c.

BIDS: Three bids were received on Schedule I (clearing, etc.) on July 22, 1942, ranging from the low of $245,587 to $273,252. On Schedule II (concrete paving) one bid was received, $357,375; and on Schedule II-A (bituminous paving), three bids were opened ranging from $192,300 to $254,620. Five bids were received on the lighting contract (Schedule III) ranging from the low of $17,516 to $23,369. This bid was on the basis of the transformer house (Item 28 in tabulation below) and elimination of transformer house and airport control panel.

Schedule I—Clearing, Drainage, etc.

LIST OF BIDDERS: (Engineer's estimate, $232,074.)

1. Depew Paving Co., Inc., Depew, N. Y., and John B. Schultz Contracting Co., Inc., Buffalo, N. Y. (contract)	$245,587
2. Tomack Subsidiary Co., Inc., Rochester, N. Y.	254,220
3. C. B. Moon Co., Dunkirk, N. Y.	273,252

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Clearing and grubbing	L. S.	$29,000.00	$20,000.00	$20,000.00
2. Excavation	286,000 c. y.	.55	.60	.60
3. 8-in. I. D. pipe, runway drainage	7,500 l. f.	1.10	1.30	2.00
4. 10-in. I. D. pipe, runway drainage	3,800 l. f.	1.25	1.40	2.15
5. 12-in. I. D. pipe, runway drainage	867 l. f.	2.40	2.50	2.60
6. 15-in. I. D. pipe, runway drainage	3,177 l. f.	2.80	3.15	3.15
7. 10-in. I. D. pipe, field drains	800 l. f.	1.25	1.50	2.00
8. 12-in. I. D. pipe, field drains	2,350 l. f.	2.40	2.50	2.25
9. 15-in. I. D. pipe, field drains	960 l. f.	2.80	3.15	3.00
10. 10-in. I. D. pipe, culverts	600 l. f.	1.50	1.60	2.00
11. 12-in. I. D. pipe, culverts	105 l. f.	2.65	2.70	2.50
12. 15-in. I. D. pipe, culverts	700 l. f.	3.05	3.35	2.90
13. Porous backfill material	3,550 c. y.	2.70	1.65	3.00
14. Manhole, in place	35 ea.	75.00	105.00	200.00
15. Catchbasins, in place	11 ea.	60.00	75.00	125.00
16. Concrete	1 c. y.	25.00	20.00	25.00
17. Reinforcing steel	100 lb.	.12	.10	.10
18. Stone riprap	25 c. y.	25.00	10.00	10.00
19. Additional ditch excavation	50 c. y.	1.25	1.50	4.00
20. 42-in. I. D. pipe, culverts	50 l. f.	15.00	15.00	15.00
21. 18-in. I. D. pipe, culverts	25 l. f.	6.00	5.00	8.00
22. Drop inlets, in place	80 ea.	60.00	70.00	100.00
23. Fiber duct	4,500 l. f.	.75	1.00	1.00

Schedule II-A—Bituminous Paving (alternate)

LIST OF BIDDERS: (Engineer's estimate, $164,485.)

1. Depew Paving Co., Inc., Depew, N. Y., and John B. Schultz Con. Co., Inc., Buffalo, N. Y. (contract)	$192,300
2. Tomack Subsidiary Co., Inc., Rochester, N. Y.	217,315
3. C. B. Moon Co., Dunkirk, N. Y.	254,620

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Gravel base course	52,000 c. y.	$1.15	$1.45	$2.00
2. Bituminous prime coat	62,000 gal.	.14	.14	.14
3. Surface course	16,400 ton	7.00	7.70	8.00
4. Seal coat, bituminous material	31,000 gal.	.14	.13	.12
5. Seal coat, aggregate	1,170 ton	4.00	2.50	6.00

Schedule III—Airport Lighting

LIST OF BIDDERS: (Engineer's estimate, $18.61

1. Schanche Constr. & Engr. Co., St. Louis, Mo. (lo	$17,516
2. Edward Zwicker Corp., New York, N. Y.	20,530
3. Elco Installation Inc., New York, N. Y.	21,257
4. John G. Hellman, Brooklyn, N. Y.	21,936
5. Berry Electrical Co., Brooklyn, N. Y.	23,369

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Transformer house (alternate)	L. S.	$5,200.00	$5,562.00	$4,640.00
2. Installing tower	L. S.	500.00	976.00	442.00
3. Excavating trench, 18-in. deep	23,000 l. f.	.10	.06	.13
4. Excavating trench, 36-in. deep	1,000 l. f.	.40	.40	.32
5. Install cable in trench	28,000 l. f.	.03	.05	.06
6. 2-in. galvanized conduit	50 l. f.	1.00	.85	.48
7. Install cable in duct	4,500 l. f.	.05	.14	.07
8. Contact lights, clear	15 ea.	94.00	106.00	88.00
9. Contact lights, yellow-clear	62 ea.	94.00	107.00	92.00
10. Range lights, yellow-green	14 ea.	94.00	107.00	93.00
11. Contact lights, clear	1 ea.	94.00	151.00	94.00
12. Contact lights, yellow-clear	2 ea.	94.00	152.00	94.00
13. Construction lights	4 ea.	25.00	23.00	51.00
14. Transformer, un-named KVA	1 ea.	90.00	116.00	136.00
15. Transformer, 0.25 KVA	1 ea.	90.00	125.00	136.00
16. Transformer, 0.50 KVA	1 ea.	90.00	132.00	136.00
17. Transformer, 1.00 KVA	1 ea.	90.00	152.00	136.00
18. 25-ft. pole	1 ea.	40.00	73.00	86.00
19. 35-ft. pole	1 ea.	50.00	76.00	96.00
20. 45-ft. pole	1 ea.	60.00	92.00	112.00
21. 55-ft. pole	1 ea.	75.00	104.00	145.00
22. 65-ft. pole	1 ea.	100.00	150.00	180.00
23. Installing wind cone	L. S.	100.00	145.00	240.00
24. Concrete	1 c. y.	20.00	11.00	14.00
25. Reinforcing steel	100 lb.	.10	.19	.12
26. Airport control panel (alt.)	L. S.	1,000.00	1,150.00	1,047.00
27. Install underground cable	300 l. f.	1.50	1.40	2.55
28. Transformer house (alt.)	L. S.	3,000.00	3,797.00	4,480.00

HIGHWAY, NEW MEXICO

OWNER: New Mexico State Highway Department, Santa Fe.

PROJECT: Grading, minor drainage structures, three creosoted timber box culverts each over 20-ft. clear span, base surfacing, double penetration wearing top, and other miscellaneous construction on U. S. Highway 80 between Lordsburg and Road Forks, Hidalgo County, N. M. Length 7.718 miles.

CONDITIONS: Contractor to furnish all material and complete project in 225 weather working days. Railway facilities available to Lordsburg, and highway transportation to site of work. Wage rates are: skilled labor, 80c. to $1.50 per hr.; semi-skilled, 60 to 80c.; and common, 45 to 55c.

LIST OF BIDDERS: (Bids opened July 29, 1942.)

1. Brown Bros., Albuquerque, N. M. (contract)	$294,606
2. Martin & Cowart, Albuquerque, N. M.	320,389
3. Skousen Bros., Albuquerque, N. M.	333,331

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Remove old drainage structures	L. S.	$100.00	$500.00	$2,000.00
2. Remove obstructions	L. S.	100.00	25.00	100.00
3. Unclassified excavation	212,500 c. y.	.18	.30	.40
4. Excavation for structures	350 c. y.	2.00	2.00	2.00
5. Excav. for pipe culverts	320 c. y.	2.00	2.00	2.00
6. Overhaul	132,000 sta. y.	.02	.03	.03
7. Haul	761,000 ¼-mi. y.	.03	.03	.03
8. Rolling, sheepsfoot roller	1,819 hr.	6.00	5.00	4.00
9. Base course surfacing, No. 1 aggr.	40,870 ton	.90	.80	.75
10. Base course surfacing, No. 2 aggr.	43,159 ton	.80	.70	.75
11. Watering	3,528 M gal.	3.00	3.50	2.50
12. Treated timber, box culverts	172.46 M bm.	150.00	175.00	200.00
13. Conc. culv., 24-in. 4½-in. shell	324 l. f.	5.00	7.50	9.00
14. Conc. culv., 30-in. 5½-in. shell	240 l. f.	7.00	9.00	10.00
15. Conc. mon. and marker, unrein.	2 ea.	25.00	25.00	50.00
16. Gates, Texas type	4 ea.	3.00	5.00	10.00
17. Bracing	13 ea.	5.00	4.00	2.00
18. Rt.-of-way and sta. markers	80 ea.	3.00	5.00	4.00
19. Remove and rebuild fence	40,710 l. f.	.03	.04	.05
20. Obliterating old road	7 mi.	100.00	100.00	200.00
21. Contour ditches	400 l. f.	.10	.05	.25
22. Ballast	97,045 ton	.60	.60	.55
23. Mechanical tamping	320 hr.	5.00	5.00	10.00
24. Rolling, steel-tired roller	154 hr.	7.00	6.00	5.00
25. Preparation of base course	7.718 mi.	400.00	700.00	500.00
26. Liquid. asph. road oil, type MC-3	1,941 bbl.	7.00	5.50	5.00
27. Cover material	3,434 ton	4.00	5.00	4.00
28. Asphalt	1,855 bbl.	7.00	6.00	5.00
29. New posts for rebuilding fence	2,467 ea.	.30	.35	.50

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Miscellaneous Notes on Booklets and Reprints

(*Continued from p. 112*)

the highways, on highway services, and on manpower engaged in highway operations.

Hazards Involved in the Handling of Chemicals are covered in the sixth edition of "A Table of Common Hazardous Chemicals" prepared by the National Fire Protection Association (60 Batterymarch St., Boston, Mass.) in cooperation with the American Chemical Society. Included is the latest information on methods for extinguishing fires with chemicals and on the shipping and storage of inflammable chemicals. 20c.

A Variety of Information concerning the operations of the U. S. Bureau of Reclamation is contained in "Reclamation Handbook — Conservation Bulletin No. 32" just issued by the bureau. (Copies may be obtained from the Superintendent of Documents, Washington, D. C., 20c.) In addition to statistics as to the operations of the bureau since its organization, the pamphlet also gives up-to-date information on the present status of such undertakings as the Columbia Basin irrigation project centering around the power and water provided by Grand Coulee Dam.

An Index of all public announcements by the Office of Price Administration and its predecessors over a period of slightly more than a year and seven months has been compiled by the OPA under the title of "Federal Price Control." Copies can be obtained from the Superintendent of Documents, Washington, D. C., 20c.

New Engineering Books

Highway Research Board—Proceedings Twenty-First Annual Meeting 1941. Edited by Roy W. Crum. 561 pp. Washington, D. C. $3.25.

American Highway Practice—By L. I. Hewes. Volume II. 492 pp. John Wiley & Sons, Inc., New York and London. $6.

Technique of Plywood—By Charles B. Norris. 249 pp. I. F. Laucks, Inc., Seattle, Wish. $2.50.

Mathematics of Modern Engineering—By Ernest G. Keller. Volume II, Mathematical Engineering. 309 pp. John Wiley & Sons, Inc., New York and London. $4. *This book relates chiefly to electrical and mechanical engineering.*

Plant Protection—By E. A. Schurman. 148 pp. Cornell Maritime Press, New York. $2. *Describes methods for organizing a police force and for protecting plants against espionage and sabotage.*

The Marine Power Plant—By Lawrence B. Chapman. 401 pp. McGraw-Hill Book Co., Inc., New York and London. $4.

Engineering Mechanics—By Frank L. Brown. Second Edition. 503 pp. John Wiley & Sons, New York and London. $4.

Why We Have Automobile Accidents—By Harry R. De Silva. 394 pp. John Wiley & Sons, New York and London. $4.

Introduction to Highway Engineering—By John H. Bateman. Fourth Edition. 459 pp. John Wiley & Sons, New York and London. $4.

How to Remodel a House—By J. Ralph Dalzell and Gilbert Townsend. 528 pp. American Technical Society, Chicago. $4.75.

Industrial Drawing—By H. R. Thayer. 195 pp. McGraw-Hill Book Co., Inc., New York and London. $1.75.

Blue Print Reading and Sketching—By H. R. Thayer. Second Edition. 135 pp. McGraw-Hill Book Co., Inc., New York and London. $2.25.

Reading Engineering Drawings — By George F. Bush. 60 pp. John Wiley & Sons, Inc., New York and London. $2.

Reports and Pamphlets

Camouflage With Planting—By Ralph Rodney Root. Ralph Fletcher Seymour, 410 S. Michigan Ave., Chicago. $1.50.

War-Time Transportation—The Pennsylvania Department of Commerce. A program by the Commonwealth of Pennsylvania.

Red River of the North Research Investigation—North Dakota State Department of Health, Division of Sanitary Engineering, Bismark, N. D.

Kansas City, Missouri—Annual report of the Water Department, 1941.

Wartime Road Problems—No. 1. Curing concrete pavements under wartime restrictions on critical materials. Highway Research Board, 2101 Constitution Avenue, Washington, D. C.

Pittsburgh, Pa. — Annual Report City Planning Commission, 1941.

(*Continued on p. 126*)

This Wood Has Gone to War in Tough Parts of the World

WOLMANIZED LUMBER* went to war in the tropics years ago, when it joined the rubber and banana planters in their fight against decay and termite attack. Today, because of its highly successful performance on peacetime projects there, it has been drafted for similar wartime service.

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Reports and Pamphlets

(*Continued from page 125*)

MILWAUKEE'S PROGRESS 1941—Municipal Reference Library, 803 City Hall, Milwaukee, Wisconsin.

LOOKING AHEAD—A Program for the Future. A progress report by the City Planning Commission, Watertown, New York.

INDUSTRIAL QUALITY OF PUBLIC WATER SUPPLIES IN GEORGIA—By William L. Lamar. Superintendent of Documents, Washington, D. C. 15c.

PROCEEDINGS OF THE TWENTY-EIGHTH ANNUAL HIGHWAY CONFERENCE—University of Michigan, Feb. 18–20, 1942. Published by the university, Ann Arbor, Mich.

WAR-TIME HIGHWAY TRANSPORTATION RESTRICTIONS—By Chester H. Gray, National Highway Users Conference, Washington, D. C.

RAILROAD CONSTRUCTION INDICES—Engineering Section of the Bureau of Valuation of the Interstate Commerce Commission, Washington, D. C.

RECLAMATION HANDBOOK — Conservation Bulletin No. 32. U. S. Department of the Interior. Superintendent of Documents, Washington, D. C. 20c.

THE USE OF CALCIUM CHLORIDE IN CONCRETING—Bulletin No. 28. Calcium Chloride Assoc., Detroit, Mich.

SKIDPROOFING ICY ROADS AND STREETS—Bulletin No. 27. Calcium Chloride Assoc., Detroit, Mich.

PORTLAND, MAINE—Thirty-fifth Annual Report of the Portland Water District.

YEAR BOOK—Association of Professional Engineers of the Province of British Columbia, 929–930 Birks Bldg., 718 Granville St., Vancouver, B. C.

INVESTIGATION OF THE POLLUTION OF THE ANDROSCOGGIN RIVER AND REMEDIAL MEASURES—Sanitary Water Board, Augusta, Maine.

DISPLACEMENTS AND STRESS IN THE GENERAL TWO-DIMENSIONAL FRAMEWORK—By Yves Nubar. Copies are on file in the Engineering Societies Library, 33 W. 39th St., New York, and in the library of Columbia University, New York.

ST. PAUL, MINN.—Sixtieth annual report of The Board of Water Commissioners. 1941. Water Department.

CHARLESTON, S. C.—Year book. 1940. Obtainable from the Mayor, Henry W. Lockwood.

CODE OF MINIMUM REQUIREMENTS FOR INSTRUCTION OF WELDING OPERATORS—Part A: Arc Welding of Steel $\frac{3}{16}$ to $\frac{3}{4}$-in. thick (Tentative). American Welding Society, 33 W. 39th St., New York. 50c.

MEN AND JOBS

A. H. Kennedy, district WPA supervisor at Durham, N. C., until the office was closed because of a cut in federal appropriations, has entered private employment at Charlotte.

Olaf Moland has been named city engineer of Sudbury, Ont.

Ewing Sloan, assistant regional engineer for the Federal Works Agency, has been attached to the Mississippi State Work Projects Administration as a result of a merger of the agencies.

W. B. McMullen, of Sudbury, Ont., has been appointed engineer in charge of defense construction works in the Maritime Provinces for E. G. M. Cape & Co., Ltd., of Montreal.

Lieut. Col. Edward M. Markham, Jr., has been named commanding officer of the 303rd Engineer Regiment of the 78th Division, in training at Camp Butner, N. C.

George A. Ridgway, senior engineer in the construction bureau of the Missouri state highway department, has been commissioned a major in the Corps of Engineers.

Charles L. Goodwin, of Raleigh, N. C., has been commissioned a first lieutenant in the Corps of Engineers.

F. D. Kinnie, former Los Angeles regional engineer for the Santa Fe Railroad, has been appointed chief engineer for the eastern division in Topeka, Kansas.

J. E. Spedden, Jr., engineer with the Salem Steel Co. at Winston-Salem, N. C., has been commissioned a second lieutenant in the U. S. Army.

Samuel Gray, assistant hydraulic engineer of the Nova Scotia Power Commission, has been appointed to the board of the Wartime Bureau of Technical Personnel, with headquarters at Halifax, N. S.

Capt. George Bock, area engineer in Fort Worth, Texas, for the Denison district U. S. Army Engineers, has been promoted to the rank of major.

F. C. Vjerck, assistant engineer for the Farm Security Administration at Lincoln, Neb., has been named district FSA engineer in Arkansas, Louisiana and Mississippi.

William Henschen, of Garner, Iowa, has

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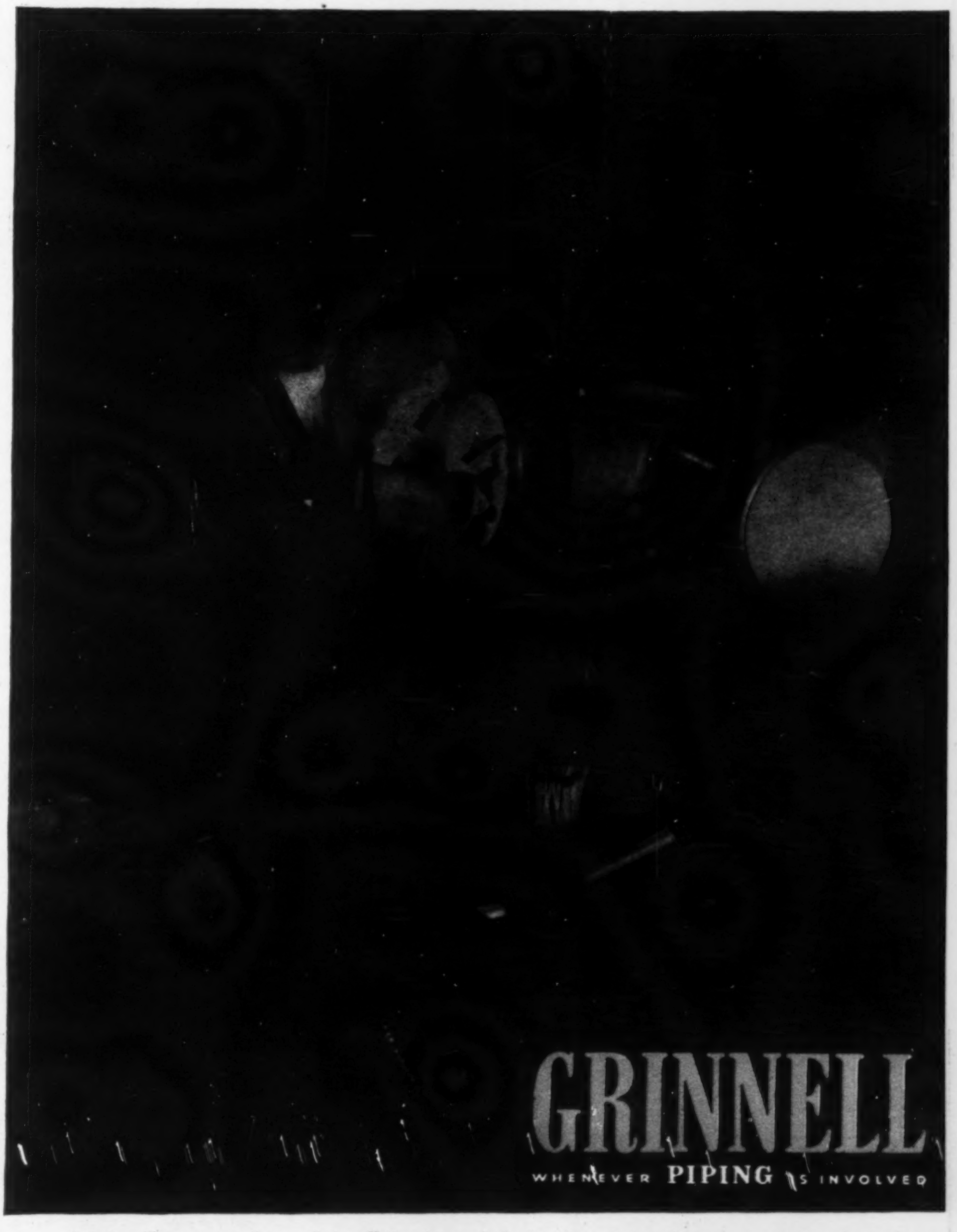

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become Hancock, Iowa, county engineer.

B. B. Straight, who has been resident engineer for the local housing authority during construction of two FPHA housing developments at Gary, Ind., is now a structural engineer in the engineering department of the Carnegie-Illinois Steel Corp., Gary Works.

H. J. Nethken has become acting dean of the school of engineering of Louisiana Institute of Technology, succeeding **Roy T. Sessums,** who left recently to enter the army.

A. H. Stevens, former Fort Lauderdale, Fla., city engineer, is on active service in the Services of Supply of the Army.

W. A. Warrick, assistant district engineer of the Pennsylvania Department of Highways at Clearfield, has been named acting district engineer to succeed **S. R. Collins,** recently commissioned a captain in the Corps of Engineers.

John C. Mueller, executive officer for the area engineer at the Twin Cities ordnance plant, has been promoted to the rank of major in the Corps of Engineers.

John R. McQuillan, former manager of the Milwaukee district WPA office, has been named state director for the Federal Housing Administration in Wisconsin.

C. H. Storms, of Billings, Montana, has been employed as city engineer at Laurel, replacing **T. A. Rigney,** who resigned recently.

Roy A. Nelson, of Butte, Mont., has been promoted to associate administrative assistant in the Office of the Division Engineer, Panama Canal Zone.

C. Kenneth Smith, formerly an engineer for the Good Roads Machinery Co., Inc., of Albany, N. Y., is now equipment consultant to the Office of the Chief of Engineers, U. S. Army, assigned to the Middle Atlantic, North Atlantic and New England divisions.

K. G. Andriessen, senior highway inspector on concrete and timber bridge construction for the North Carolina state highway and public works commission, has resigned to enter the Navy.

B. B. Petroff, engineer in the department of statistics and planning, North Carolina Highway and Public Works Commission, has been called to Army service.

Glenn R. Blackburn, former city engineer for Corpus Christi, Tex., has been appointed chief engineer for Brown & Bellows on the construction of a Navy ammunition depot in Oklahoma.

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Archie B. Uzzle, Jr., assistant city engineer of Raleigh, N. C., has been called to service in the Navy.

Jake Boyd, county engineer at Lake Worth, Fla., since 1926, has been commissioned a lieutenant commander in the Navy's Civil Engineer Corps.

R. P. Harmon, of Belle Fourche, has been appointed South Dakota state highway commissioner, replacing **James H. Lake,** who resigned recently.

Clifford Lewis, of Anchorage, Ky., has been commissioned a captain in the Corps of Engineers.

Ward B. Carpenter, assistant engineer on the Santee-Cooper Project in South Carolina, has been named project engineer for both the Santee-Cooper and the $8,000,000 High Point project on the Yadkin River in North Carolina.

L. C. Benedict, who was chief regional engineer for the WPA in New Orleans and in Atlanta until the recent elimination of those regional offices, is now with the Shore Facilities section of the Navy Department as a civilian production engineer.

Philip B. Brown, Rockingham, N. C., inspector in the materials and test department for the North Carolina State Highway and Public Works Commission, has resigned to enter the U. S. Navy.

Among those appointed to a full time Iowa state technical staff to assist cities in traffic conservation work are **W. W. Davis** of the Iowa highway commission and **H. A. Franklin,** safety engineer for the state commerce commission.

H. T. Smothers, right-of-way engineer with the North Carolina State Highway and Public Works Commission, has resigned to accept a private post.

Forrest L. Park, a civil engineer for the Trinity Improvement Association, at Fort Worth, Tex., has been granted a leave of absence to join the Corps of Engineers, at Galveston.

G. Gale Dixon, who has recently served as chief sanitary engineer for the Caribbean Architect-Engineer, in the design of water supply and sewerage facilities for the Army bases in the southern Caribbean area, is now associated with Parsons, Klapp, Brinckerhoff & Douglas, engineers of New York.

Col. Theodore Wyman, Jr., who spent seven years on the Missouri River improvement for the Corps of Engineers, has received the distinguished service medal, the Army's highest award for

★

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non-combatant service. The medal was given for "exceptionally meritorious service in emergency construction in the South Pacific area last winter."

Denzil Doggett, a veteran of the first World War and now head of the Division of Engineering of the Indiana State Conservation Department, has been commissioned a captain in the U. S. Air Forces.

Edward L. Pine, former assistant city engineer of Reno, Nev., has been ordered to active service as a first lieutenant in the Corps of Engineers.

Bernard A. O'Leary, deputy engineer for the city of Halifax, N. S., has resigned to engage in private engineering work.

Lt. Col. Norman Clair Sutherland, of Mount Royal, Quebec, has been appointed commander of the Royal Canadian Engineers for the 6th and 7th Canadian divisions.

Frederick C. Halton, special assistant to Connecticut highway commissioner, **William A. Cox,** left the highway department Aug. 29 to accept a commission in the U. S. Army.

Maj. John M. Cape, formerly a field engineer with the E. G. M. Cape Co., Ltd., of Montreal, has been appointed to the headquarters staff of the Canadian Army's medium artillery division.

Charles E. Conley, chief planning official of the City of Cleveland, Ohio, for the past 20 years, recently tendered his resignation as chief engineer for the City Plan Commission—a post he held since 1922.

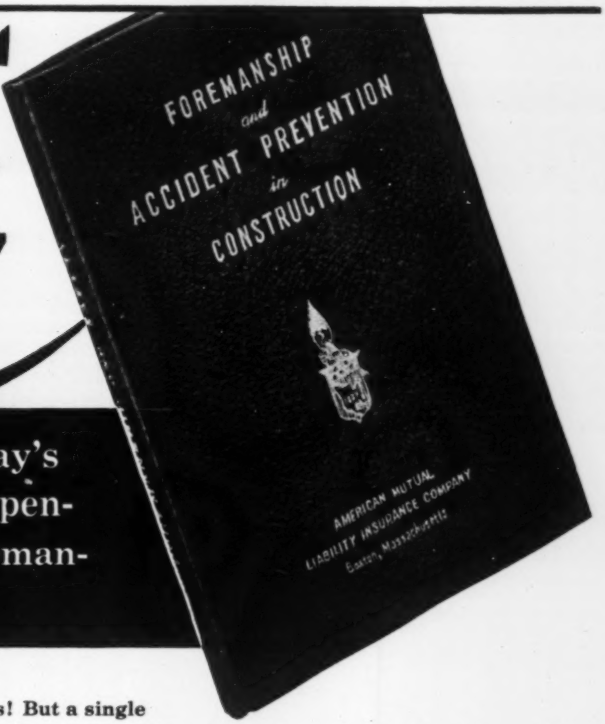
Carlisle Mannheim, resident engineer inspector for the Santee-Cooper project in South Carolina, has been sent to Winston-Salem, N. C., to become senior engineer on the $8,000,000 High Point hydro-electric project. He succeeds **W. F. E. Cabaniss,** who recently was commissioned a lieutenant in the Naval Reserves.

Alan B. Wright, formerly Northern division sales manager and more recently manager of the Sanford, Fla. plants of the Florida Power & Light Co., has been appointed division superintendent in charge of engineering, with headquarters at Daytona Beach.

Samuel N. Gray, of Halifax, N. S., assistant hydraulic engineer of the Nova Scotia Power Commission, has been appointed regional representative of the Wartime Bureau of Technical Personnel, for the maritime provinces. He has been granted a leave of absence from the Power Commission to pursue this work.

A BOOK ABOUT LEADERS, FOR LEADERS...

"FOREMANSHIP"



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Chapter I

Foremanship — the foreman's responsibility to his job, to the superintendent, to his men, to his fellow foremen, to subcontractors and the general public; qualities which make for successful foremen 7

Chapter II

The Foreman's Place in Accident Prevention — planning for accident prevention; accident investigation; developing the accident prevention program 15

Chapter III

The Foreman and His Men — selection and hiring, placing and training, supervisory methods 23

Chapter IV

Job Planning — in relation to long range planning, layout of the job, receipt of materials, day-to-day plan 33

Chapter V

Physical Protection — excavation, staging and scaffolding, runways and platforms, barricades, overhead protection, clothing 41

Chapter VI

Care, Use and Storage of Equipment — principles of selection, testing and inspection; rigging, hand tools, supports, derricks, scaffolds, safe practice rules, machine operators, trucks, cranes, moving equipment, moving material, air equipment, machine guards, yard storage, tool storage 51

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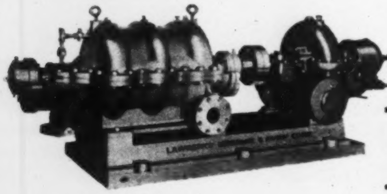

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MEETINGS

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION OF AMERICA, Meeting to be held at Hotel Sherman, Chicago instead of Stevens Hotel, Sept. 15-17.

AMERICAN WELDING SOCIETY, 23rd annual meeting, Hotel Cleveland, Cleveland, Ohio, Oct. 12–15.

AMERICAN SOCIETY OF CIVIL ENGINEERS; Fall Meeting, jointly with the Engineering Institute of Canada, Hotel General Brock, Niagara Falls, Ontario, Oct. 14–15.

NATIONAL RECLAMATION ASSOCIATION, Denver, Colo., Oct. 14–16.

AMERICAN PUBLIC WORKS ASSOCIATION, Cleveland, Ohio, Oct. 18–21.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION, Hotel Sherman, Chicago, Ill., Oct. 20–22.

NATIONAL SAFETY COUNCIL, 31st National Safety Congress and Exposition, Chicago, Hotel Sherman, La Salle and the Morrison. Convention headquarters in the Sherman, Oct. 27–29.

AMERICAN PUBLIC HEALTH ASSOCIATION, St. Louis, Mo., Oct. 27–30.

FEDERATION OF SEWAGE WORKS ASSOCIATIONS, 3rd annual convention, Hotel Statler, Cleveland, Ohio, Oct. 22–24.

INSTITUTE OF TRAFFIC ENGINEERING, Sherman Hotel, Chicago, Ill., Oct. 25–26.

REGIONAL AND LOCAL MEETINGS

NEW ENGLAND WATER WORKS ASSOCIATION, Annual Meeting, Hotel Statler, Boston, Mass., Sept. 15–16.

NORTH DAKOTA WATER AND SEWAGE WORKS CONFERENCE, annual meeting, Great Northern Hotel, Williston, N. D., Sept. 21–23.

SOUTH DAKOTA WATER AND SEWAGE WORKS CONFERENCE, 8th annual meeting, Huron, S. D., Sept. 28–29.

Regional War Time Conference, jointly sponsored by FOUR STATES SECTION and NEW JERSEY SECTION of the AMERICAN WATER WORKS ASSOCIATION and the PENNSYLVANIA WATER WORKS OPERATORS' ASSOCIATION, Benjamin Franklin Hotel, Philadelphia, Pa., Oct. 7–9.

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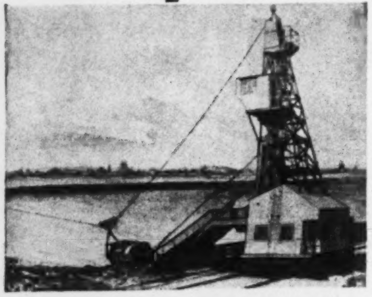
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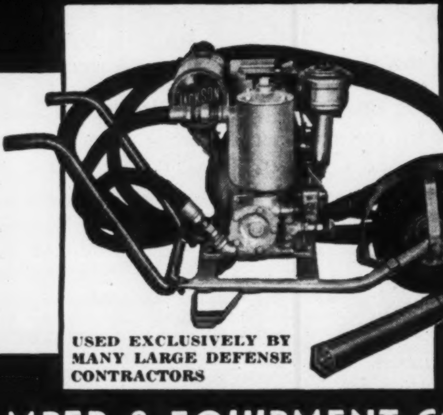
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WORKS ASSOCIATION, War-Time Conference, Little Rock, Ark., Oct. 12-14.

AMERICAN WATERWORKS ASSOCIATION, California Section, 23rd annual convention (War Conference), Oakland Hotel, Oakland, Calif., Oct. 28-31.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA, Third Annual Water Conference, Wm. Penn Hotel, Pittsburgh, Pa., Nov. 9-10.

Elections and Activities

THE Wartime Conference of the Southwest Section of the American Water Works Association, covering Arkansas, Louisiana, Oklahoma and Texas, will be held Oct. 12 to 14 at Little Rock, Ark.

THE Institute of Traffic Engineers will hold its thirteenth annual meeting Sunday and Monday, October 25-26, at the Hotel Sherman, Chicago, Ill. War transportation analyses based upon practical experience will be the theme of the meeting. The group will hold a joint session with the National Safety Council on Tuesday, October 27.

ANNUAL convention of the National Reclamation Association will be held at Denver, Colo., Oct. 14-16, instead of on the Pacific Coast. Despite the vote in the 1941 convention to hold this year's meeting in California, directors said the change was made because of restrictions on travel and other factors connected with the national emergency.

MEMBER boards of the National Council of State Boards of Engineering Examiners have voted by a large majority to postpone the annual meeting for one year. Therefore, no meeting will be held this fall, but it is the intention of the group to hold a meeting Oct. 25-28, 1943, in Indianapolis.

JOHN O. JACKSON, program director and legal adviser of Engineering Professions Club of Jacksonville, Fla., has been elected president of the club to succeed James Moorhead, now a captain in the U. S. Army.

CONTINUING a policy inaugurated last year of holding the annual meeting outside of Washington in order to facilitate the war program, the Highway Research Board will hold its 22nd annual meeting at the Statler Hotel, St. Louis, Mo., December 2-4. The American Association of State Highway Officials annual meet-

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To get your scrap on its way to the steel mills, sell it to a junk dealer, or get in touch with your local Industrial Salvage Committee. Many organizations have appointed someone to be in charge of salvage—someone who has authority to order the scrapping of material not in actual use, or material which will go out of use in the near future. In this way, needed iron and steel scrap can be located and made available for the war effort most efficiently.

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WORLD'S LARGEST WATER DEVELOPERS

ing will also be held at the Statler, December 7–9. On the two intervening days between these meetings the Committee on Materials of the American Association of State Highway Officials will meet.

OFFICERS of the Architects Society of Ohio were re-elected at the group's ninth annual convention, held at Cedar Point. Ralph W. Carnahan, of Dayton, was elected president.

THE Detroit Rubber and Plastics Group will hold its next meeting at the Hotel Detroit Leland, on October 2.

THE date and location of the 31st National Safety Congress and Exposition have been changed due to wartime taking over of the Stevens Hotel in Chicago, according to Paul Jones, publicity director. The Congress will now be held October 27 to 29 at three Chicago Hotels—the Sherman, LaSalle and Morrison. Convention headquarters will be in the Sherman hotel.

ANOTHER shift in convention dates and scene, caused by the loss of the Stevens Hotel at Chicago to Army uses is noted by A. G. Shaver, secretary of the Roadmasters and Maintenance of Way Association of America. This group will hold its meeting at the Hotel Sherman, Chicago, September 15–17 inclusive.

THE American Railway Bridge and Building Association will hold a convention at the Hotel Sherman, Chicago, Ill., October 20–22 inclusive.

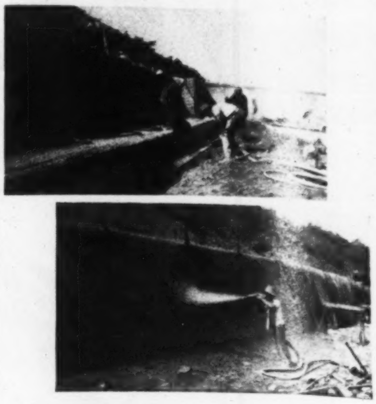
COPIES of the Proceedings of the Second Annual Water Conference of the Society Engineers' Society of Western Pennsylvania, held in November, 1941, are now available at the Society's offices, William Penn Hotel, Pittsburgh, Pa.

JAMES U. MOOREHEAD, president of the Engineering Professions Club of Jacksonville, Fla., recently tendered his resignation from the office, on accepting a commission as a captain in the Corps of Engineers.

ROY L. WILLIAMSON of Raleigh has been nominated for president of the North Carolina Society of Engineers, at a recent convention at Raleigh. E. D. Burchard, of Asheville, was nominated for vice president.

C. R. YOUNG of Toronto, president of the Engineering Institute of Canada, was principal speaker at a dinner meeting of the St. John, N. B., branch of the organization.

SEA WALL
IN NEW YORK



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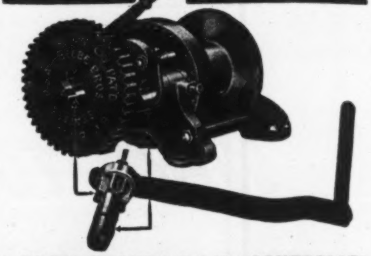

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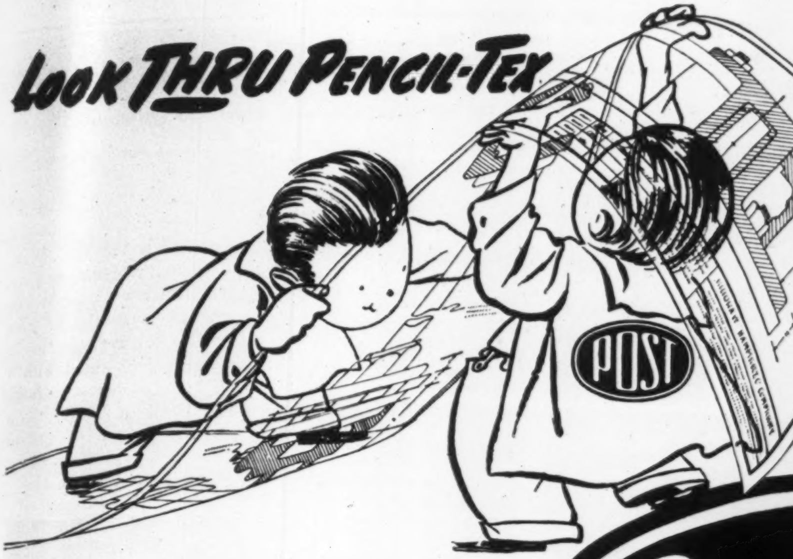

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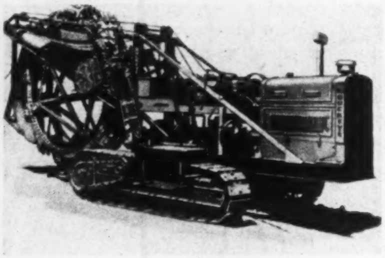
Equipment and material announcements and manufacturers' news

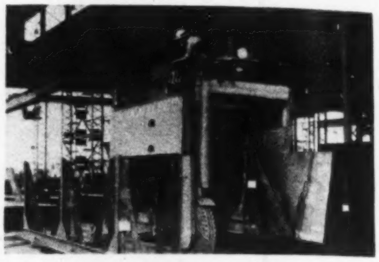


Trencher

The Buckeye Traction Ditcher Co. has announced its new model 12 Buckeye wheel type trencher. The trencher is said to be particularly efficient for pipeline, sewer and water pipe contractors and municipalities. It digs a straight-sided round-bottom trench up to 24 in. wide and 5 ft. 6 in. deep.—*Buckeye Traction Ditcher Co., Findlay, Ohio.*

Precision Balances

The new models of the Roller-Smith precision balances have been developed to meet the need for an accurately weighing instrument that can be used by unskilled or semi-skilled workers. These balances, which are available in various sizes for weights ranging from less than 3 mg. to more than 50 grams, are modified designs of the Roller-Smith Model B balance, which has been used in industrial plants and laboratories for a number of years. In these new designs the Model B-1 is available in double-hook type only when the Model MB can be furnished in single hook or double hook types. The only other difference between the two is that the MB balance is provided with a weighing chamber to protect the hook and weighing sample from drafts. Both have a guaranteed accuracy of 1/5 of 1 per cent.—*Roller-Smith Co., Bethlehem, Pa.*



Straddle Trucks

A new and important development in material handling is said to have been worked out in shipyards for transporting cut and formed plates and shapes by using straddle trucks manufactured by the Wilamette Hyster Co. The straddle truck, which has a load space 108 in.

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THERE'S a fabulous amount of magnesium in every cubic mile of sea water.

Enough magnesium for more than *four million* Flying Fortresses. Enough to lay a continuous ceiling of bombers . . . a hundred miles wide and stretching all the way from London to Berlin!

Now magnesium can't be dredged out of the ocean . . . for every ounce of this rare metal must be produced by electrolysis. This necessitates the conversion of vast amounts of alternating current to direct current, at the very water's edge.

The best means of converting power is the mercury arc rectifier. As long as ten years ago, Westinghouse Research Engineers began experimental work on a *new type* of mercury arc rectifier which would be more efficient . . . more economical . . . less costly to install and maintain than existing types.

These Westinghouse scientists realized that new untapped fields in metallurgy would be opened by the perfection of an improved mercury arc rectifier. In 1937, they brought forth the *Westinghouse Ignitron.*

The Ignitron operates on the radically new principle of *starting* and *stopping* the mercury arc with each cycle. This means that electrodes can be placed much closer together . . . grids and shields reduced . . . arc drop voltage decreased . . . voltage control simplified . . . arc-back practically eliminated. And all of this assures higher efficiency and greater reliability.

More than 1,000,000 kw of Ignitrons are now at work in magnesium, aluminum and chlorine plants, in electric railway systems, in mines, in many war industries.

And so, the germ of an idea . . . born ten years ago in the Westinghouse Electronics Laboratories . . . is now contributing its important share in winning the war today.

Westinghouse

WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, PITTSBURGH, PENNSYLVANIA

Says the water dept. supt.

"I want water gates with operating mechanisms I can depend upon, stems that will not fail, seat and disc rings that stay tight, stuffing boxes that can be easily adjusted, and bolts and nuts that will not rust together."

—and Kennedy Water Gate Valves

meet every one of these demands

EVERY PART of the Kennedy A. W. W. A. Water Gate is designed and built with one purpose—to assure dependable, trouble-free service. Stems are much stronger than required by standard A. W. W. A. specifications; the operating mechanism combines utmost simplicity, flexibility and positive action; the rings on seats and discs cannot work loose; bodies, bonnets and flanges are heavily proportioned; and all adjustable or renewable parts have special provisions for easy and speedy manipulation. You can always depend on a Kennedy A. W. W. A. Water Gate to close tightly, open easily and operate dependably.

The Kennedy Valve Mfg. Co., Elmira, N. Y.

KENNEDY

VALVES with Extra Value

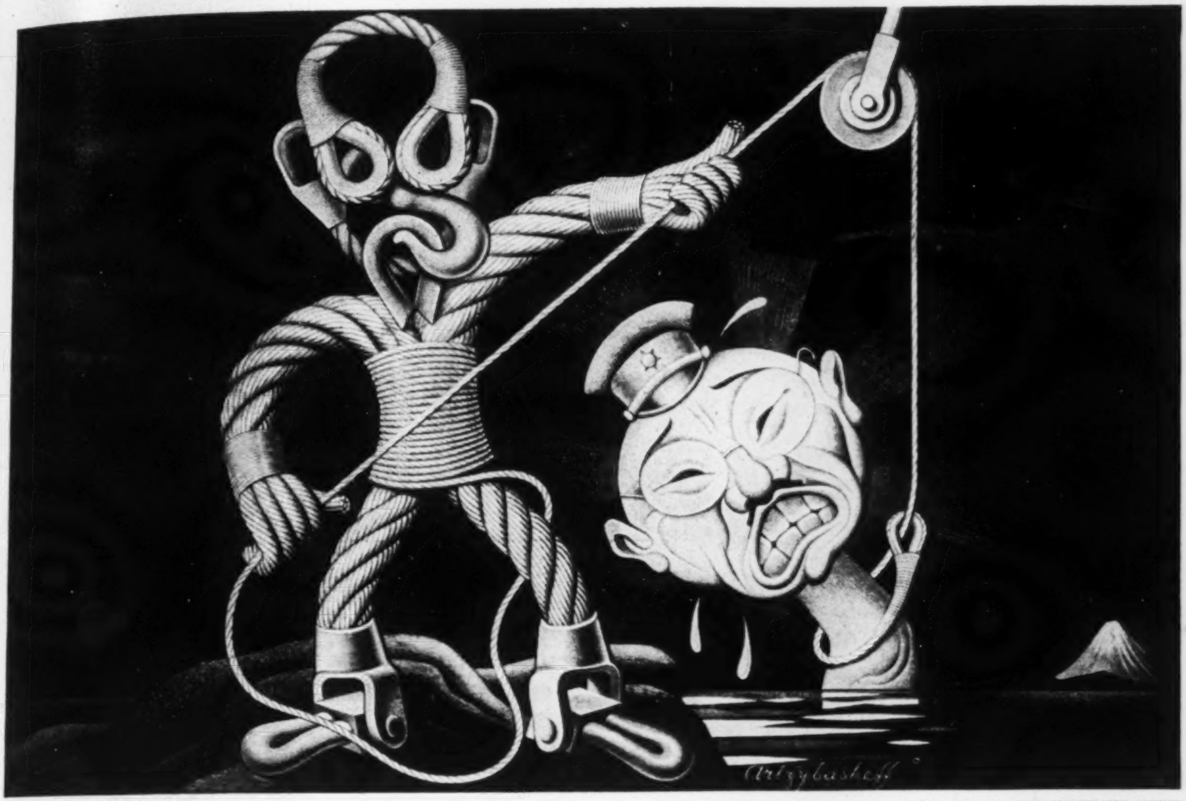
high by 57 in. wide, will pick up and carry plates up to 90 in. wide stacked vertically in special racks, one of which is shown alongside the loaded truck above. Loads up to 30,000 lb. are handled. Previously loaded racks are picked up by the straddle truck and transported to any part of the yard. The steel is left in the rack until it is taken out for use, thus saving a great deal of time by eliminating the handling of steel on and off trucks.—*Willamette Hyster Co., Portland, Ore.*

Safety Clothing

To protect welders against painful and dangerous exposure to metal sparks, the American Optical Co. of Southbridge, Mass., has announced a new and wide assortment of welders' safety clothing. A catalog, picturing and describing each of the garments, is available. The new safety clothing is said to be scientifically built in the best traditions of the manufacture. Designed by an expert welder, it is made of as few pieces of leather as possible, and constructed to offer maximum protection, fit comfortably, and give long, efficient wear.—*American Optical Co., Southbridge, Mass.*

Asphalt Shingle

Development of an "armored texture," designed to enhance the appearance and increase the weather resistance of its line of medium priced "Tite-On" asphalt shingles, has been announced by the Ruberoid Co. One important effect claimed for the new "armoring" process is that it accentuates the wood-grain appearance of the shingle by making the grain lines more pronounced. Another is that the grain lines, instead of being black, are "armored" with colored mineral granules selected to provide a pleasing color contrast with the body of the shingle. These results have been obtained, the announcement states, through



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Your country needs all possible steel for guns, tanks, ships and shells. All the *wire rope* that can be produced is needed for military and naval uses—and to speed war production in scores of industries. You can serve your country by taking care of *your* wire rope, so that replacement is postponed as long as possible.

FREE BOOK TELLS HOW

It illustrates and describes more than forty ways to *save money* on wire rope. The big pictures of right and wrong ways make it easy to spot sources of too rapid wear—and *correct* them.

Many thousands of wire rope users throughout the world use this handy book as their guide to longer wire rope life. Now, with urgent war needs for steel and wire rope, it is doubly important that every wire rope user have a copy.

If you *must* have new wire rope to maintain uninterrupted war production, help us to help you by anticipating your needs as far in advance as possible, within priority regulations.

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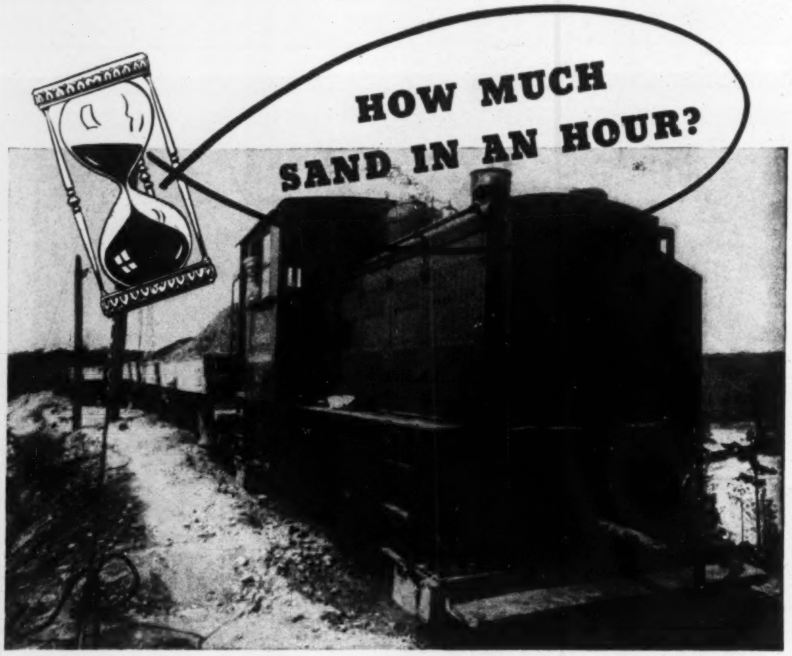

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Sand runs faster every hour where there's a rugged Plymouth Locomotive on the job to give faster, more dependable, more powerful performance. That's why Plymouth has for years been the choice of Rock Products Producers. That's why it's in the front ranks doing efficient haulage in war production. That's why it will pay you to find out now why and how Plymouth can keep you a step ahead of future competition. Write for facts and figures.

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PLYMOUTH LOCOMOTIVE WORKS
Division of The Fate-Root-Heath Co. PLYMOUTH, OHIO, U. S. A.

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WATER PIPE JOINTS
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for Bell and Spigot Water Mains
10 REASONS FOR USING

1. One lb. HYDRO-TITE equals 4 lbs. lead.
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Write for **JOINTING BOOK**
See page 115 FIBREX, our new sanitary packing
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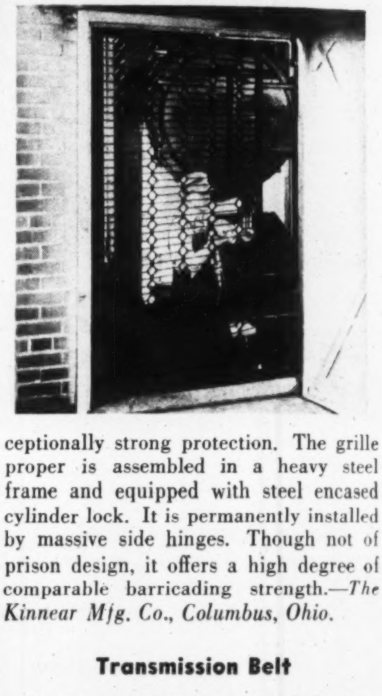
50 CHURCH STREET — NEW YORK, N. Y.

the development by Ruberoid engineers of an improved manufacturing process which does not increase the cost of the shingle. The "Tite-On" shingle derives its name from the fact that each shingle, in addition to being nailed to the roof deck, is further secured by being locked at four points with the adjacent shingles. This interlocking feature is an integral part of the special shingle design.—*The Ruberoid Co., 500 Fifth Ave., New York, N. Y.*

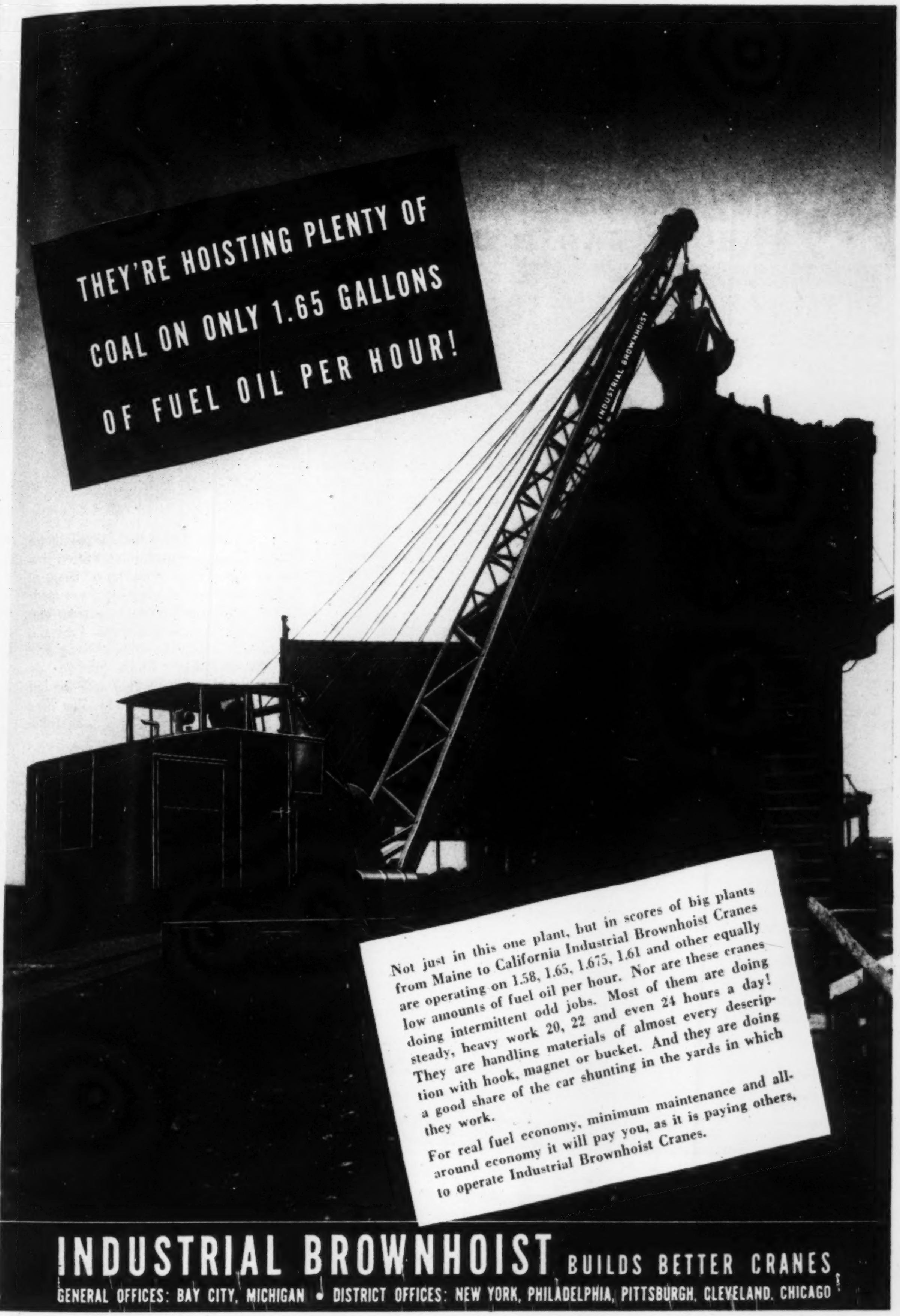
Protective Grille

With today's increased demand for protection of doorways, the announcement by The Kinnear Mfg. Co., of a new swinging type grille strikes a timely note. The grille is said to offer an economical device for barricading doorways without obstructing air, light or vision. Patterned after the rolling grille, it provides an exceptionally strong protection. The grille proper is assembled in a heavy steel frame and equipped with steel encased cylinder lock. It is permanently installed by massive side hinges. Though not of prison design, it offers a high degree of comparable barricading strength.—*The Kinnear Mfg. Co., Columbus, Ohio.*



Transmission Belt

A new type of transmission belt using 90 percent less rubber than ever before but highly superior in performance to previous types has been developed by the Goodyear Tire & Rubber Co. Goodyear officials described the belt as another contribution toward alleviating the nation's rubber shortage. Known as the "Klingtite Cord Hammermill Belt," the new belt is modeled closely after Goodyear's patented and endless compass cord belt, which is now the standard for many industrial applications of transmission belting. The new belt's flex life is said to be actually six times that of preceding types with higher crude construction. In addition, the new belt is actually endless, with no splice or "weak point"; approximately the same weight as the type of belt it replaces; has very low stretch;



THEY'RE HOISTING PLENTY OF COAL ON ONLY 1.65 GALLONS OF FUEL OIL PER HOUR!

Not just in this one plant, but in scores of big plants from Maine to California Industrial Brownhoist Cranes are operating on 1.58, 1.65, 1.675, 1.61 and other equally low amounts of fuel oil per hour. Nor are these cranes doing intermittent odd jobs. Most of them are doing steady, heavy work 20, 22 and even 24 hours a day! They are handling materials of almost every description with hook, magnet or bucket. And they are doing a good share of the car shunting in the yards in which they work.

For real fuel economy, minimum maintenance and all-around economy it will pay you, as it is paying others, to operate Industrial Brownhoist Cranes.

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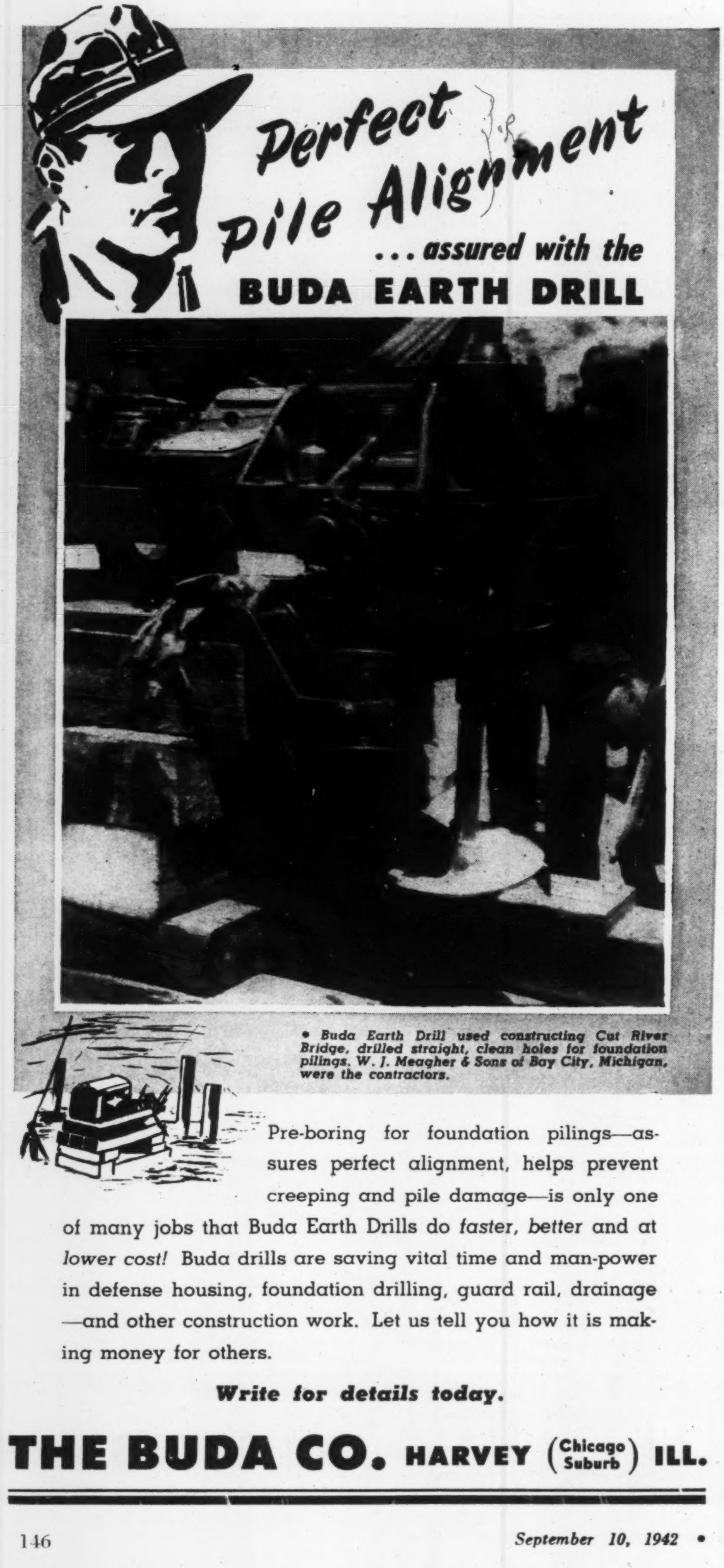

• Buda Earth Drill used constructing Cut River Bridge, drilled straight, clean holes for foundation pilings. W. J. Meagher & Sons of Bay City, Michigan, were the contractors.

Pre-boring for foundation pilings—assures perfect alignment, helps prevent creeping and pile damage—is only one of many jobs that Buda Earth Drills do *faster, better* and at *lower cost!* Buda drills are saving vital time and man-power in defense housing, foundation drilling, guard rail, drainage—and other construction work. Let us tell you how it is making money for others.

Write for details today.

THE BUDA CO. HARVEY (Chicago Suburb) ILL.

offers snug wrap around small pulleys, and is suitable for high speeds.—*The Goodyear Tire & Rubber Co., Akron, Ohio.*

Battery

With low standing loss as one of its important features, the Exide type XDG extra duty battery for war-time use on passenger cars and light commercial vehicles is announced by the Electric Storage Battery Co. The new battery has been designed with particular reference to the changes in driving conditions brought about by the rubber shortage and by gasoline rationing in certain sections of the country. These conditions, under which driving is curtailed and often limited to short runs with more frequent starting drains on the battery, have made the factor of standing loss a serious one. Other features are wood and Fiberglas separators, which contribute long life, and "No-Over-Flo" which prevents destructive acid spray on cars with the battery located under the hood.—*The Electric Storage Battery Co., Philadelphia, Pa.*

Exide
EXTRA DUTY

Tool Bits

A new line of tool bits for machining hard, tough steels and the copper or aluminum alloys recently has been made available. These tool bits are made of the same metal that has proved its value in the well-known patented "Hardsteel" drills. The new metal has many advantages when used in tool bits. It has greater shock-resistance than most cast or cemented tools, minimizing breakage; shows higher heat-resistance, permitting higher cutting speeds and deeper cuts.—*Black Drill Co., Cleveland, Ohio.*

Separators

The widespread demand for a magnetic separator to be used in commercial and school laboratories for analyzing and determining the best method of concentrating, purifying or separating various materials in small capacities or for sample testing, has brought forth several new designs of magnetic separators. One of these new laboratory units is the Stearns Style "D" size O separator which features a steel inductively magnetized revolving take-off ring employed to carry the mag-

Villages...

For Water Lines . . . *more and more communities of all sizes are adopting J-M Transite Pipe for efficient, economical water transportation. Check these advantages:*

Easy Handling . . . Transite Pipe is light in weight . . . handling requires fewer men. Mechanical equipment is needed only for the larger sizes.

Rapid Assembly . . . Transite Pipe is assembled with the Simplex Coupling, consisting of a Transite sleeve and two rubber rings. No heating or pouring operations are necessary. And even unskilled crews can form tight joints quickly and easily.

Tight, Flexible Joints . . . Simplex Couplings provide tight, flexible joints. Finished joints are checked by gauging the position of the rubber rings. Deflections up to 5° are possible at each joint . . . permitting wide sweeps to be made with straight lengths of Transite.

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For complete details, write for Transite Pressure Pipe brochure TR-11A. And for information on the many ways Transite Sewer Pipe reduces sewage disposal costs, send for brochure TR-21A. Johns-Manville, 22 E. 40th St., New York, N. Y.

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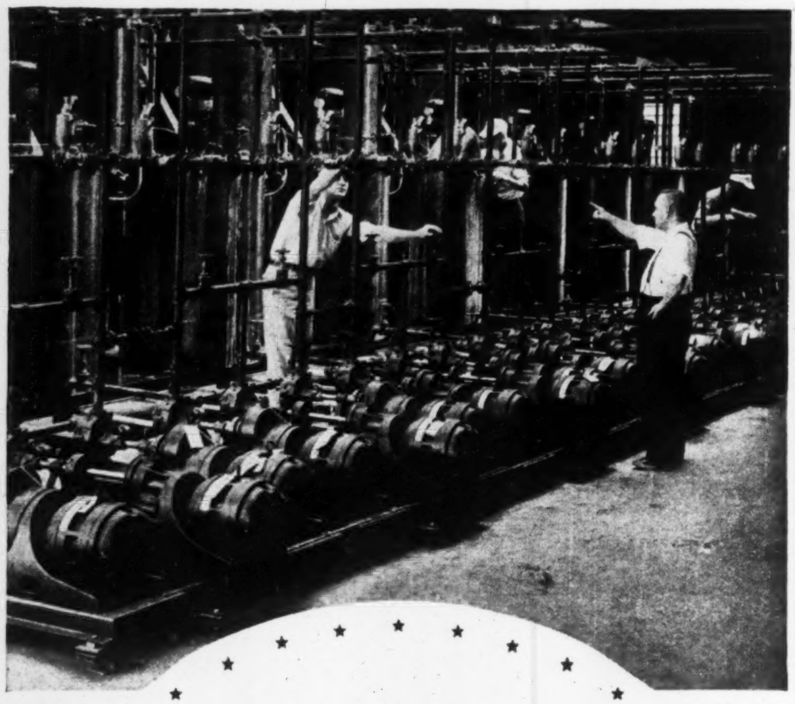
For efficient, economical water and sewer lines

These 36 F-M motor-driven rotary pumps in a large manufacturer's paint mixing room serve distant paint spray booths.



BUY PUMPS HAVING

Efficiency

That's More Than Skin Deep!

THOSE pumps you are about to buy for war production—will they serve you efficiently not only now but also through the years to come?

They will if you choose Fairbanks-Morse Pumps. For these pumps have mechanical superiority which permits them to retain their efficiency long after less highly engineered pumps begin to waste power.

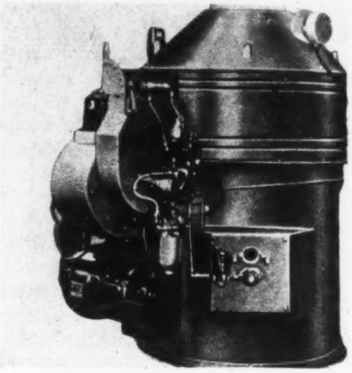
So use your priority to buy pumps for today with an eye for tomorrow. Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Illinois.

FAIRBANKS-MORSE F M PUMPS DIESELS MOTORS SCALES

netic material beyond the conveyor belt to final delivery. Two magnetic and one non-magnetic product can be produced with this machine and the regulation size unit can be designed to produce four or more magnetic products, depending on requirements.—*Stearns Magnetic Mfg. Co., Milwaukee, Wis.*

Steam Generator

A new "recirculated" type steam generating unit that is said to be invaluable for use wherever there is a demand for a steady source of steam or an emergency unit. has been developed and is being manufactured. This generator produces steam from a cold start to pressures up to 300 lb. in less than two minutes. It is available in standard "packages" of 500; 1,000, 1,500, 2,000 and 3,000 lb. evaporation per hour. The unit requires no boiler room or high draft stack. It is completely automatic or semi-automatic according to the specified requirements. A single motor drives all accessory units with water blower and fuel feed controlled by steam demand. Interlocked automatic regulation assures absolute safety.—*The Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.*

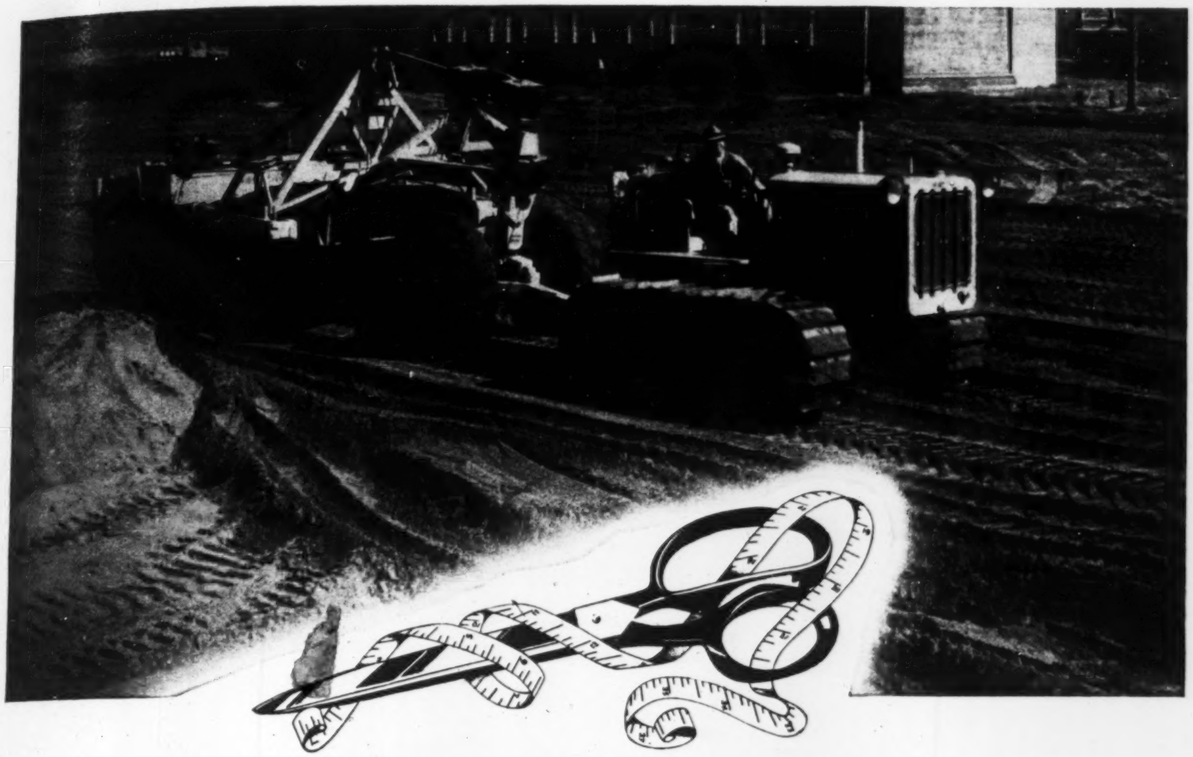


Waterproofing Masonry

Development of a new, powerful, chemical process powder, called "Drye," is said to effectively waterproof brick, stone and stucco. Equally effective inside or outside, Drye waterproofs basements, walls before plaster is applied, leaks in mortar joints and cisterns. This product can be used for hardening and waterproofing cement and mortar when included in the mix, and is suitable for patching cement floors and bonding tile to cement. Drye also is said to efficiently repair cracks in iron and can be used as a furnace cement.—*The Weather Seal Co., 12 E. Pearl St., Cincinnati, Ohio.*

Rubber Repair

Many plants producing war materials are using a new rubber plastic product on conveyor belts, pulleys and other



CUSTOM TAILORED

— a lubrication plan to fit the special needs of your particular job!

Every big construction job has its own unique lubrication problems. Type of equipment, number of working hours, and the difficulties of the operations involved determine the kind of lubrication you require. To use makeshift, run-of-the-mill lubrication is only to invite trouble—which inevitably means precious man-hours lost, schedules delayed and extra cost.

Your surest, safest policy is to call in a trained lubrication expert—a Cities Service lubrication engineer—to study your particular set-up. Let him suggest a lubrication plan based on his experience with similar equipment—to assure steady, efficient operation.

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A copy of our booklet—"Diesel Engine Lubrication"—will be sent free to the personnel of Diesel engine users.

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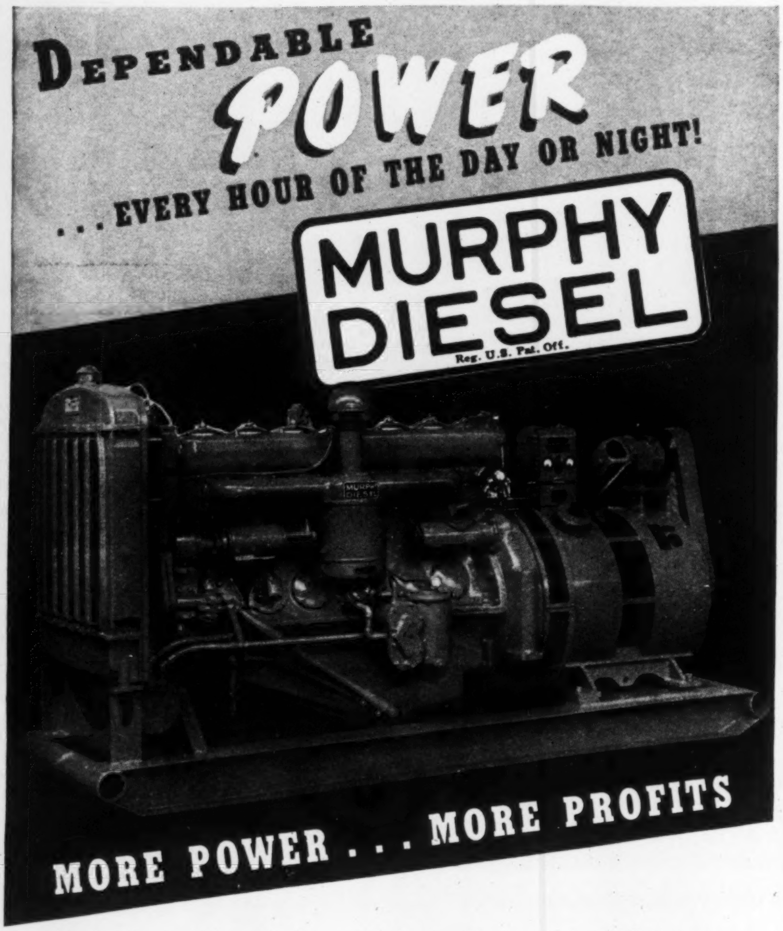
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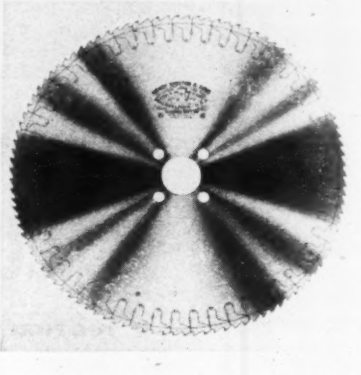
equipment according to the So-Lo Co. The material, a putty-like substance, contains a very small proportion of crude rubber. When spread on a conveyor belt it repairs holes and worn spots, making it possible for the plant to keep producing without loss of time or replacement of equipment now in service.—*So-Lo Works, Cincinnati, Ohio.*

Inserted Section Saw

A new inserted section saw, newest development of Henry Disston & Sons, Inc., is said to combine the advantages of both the inserted tooth type and solid tooth type. It is a continuous rim saw with inserted sections rather than inserted teeth—a saw that can be readily sharpened on an automatic grinder. It provides a maximum number of teeth for any given diameter and cuts extremely smooth. It can be operated at speeds up to 5,000 ft. per min. This design permits a thinner blade and cutting edge than is customary with saws having individual inserted teeth, and therefore cuts a narrower kerf which in turn means less power required to drive it.—*Henry Disston & Sons, Inc., Philadelphia, Pa.*



All-Position Electrode

A new electrode designed specifically for all-position welding of mild steel with a-c type welding machines has been developed by Wilson Welder & Metals Co., Inc. Made to fill a rapidly growing need for a high quality a-c electrode for all-position use, the Wilson No. 530 electrode complies with all requirements of the American Welding Society Classification E6011 and other specifications qualifying it for use on war work.—*Wilson Welder & Metals Co., Inc.*

Plug Valves

The Homestead Valve Manufacturing Co. has announced a new line of "Lever-Seald" plug valves for 150-lb. working pressure. Face to face dimensions of each valve of the new line are the same as those of the corresponding size of

Speed?
YES!
AND LONG LIFE
TOO!
Thor
ROCK DRILLS

EXTRA OUTPUT from Rock Drills is dependent on both drilling speed of the machines and their ease of operation. Thor Drills, with the patented Short Travel Tubular Valve, drill faster on any kind of going. They are faster in action, too, because the Thor four position throttle gives the operator complete control of drilling speed for all operations from hole starting to full power.

CAN'T AFFORD DELAYS

Besides faster performance, you need dependable performance. Thor Rock Drills give you this, too, because they are built of drop forged steel for "round the clock" service. Typical of hundreds of Thor users, the Appalachian Marble Co. quarry of Knoxville, Tenn. reports, "Our Thor #75 Rock Drill has been in use every day for a year . . . and not one cent has been spent for repairs!"

MAINTAIN YOUR SCHEDULE

Be sure your Rock Drills give you not only high output but also protection against break downs and job delays. Your Thor distributor can give you expert advice on selecting the Rock Drill that can give best performance and longest service for your particular type of work. Feel free to call on him at any time.

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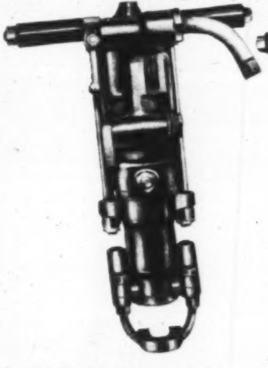
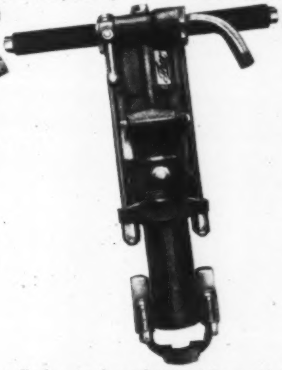
Describes each type of Thor Contractors Tool in detail, tells the type of service it is designed for, and the nature of the work it is to be used on. Gives tips on tool selection and application that will help you get the right tools for your job to save time and money. Write for your free copy.

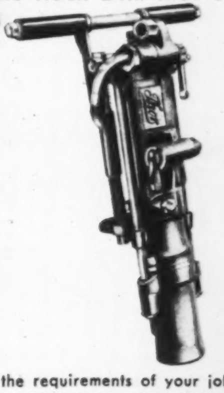
In the Thor line you can always find a tool engineered to meet the requirements of your job.



THOR #38 ROCK DRILL
Sturdy, light weight Sinker for drilling holes up to 12 feet in depth. Most suitable for soft and medium rock.



THOR #70 SERIES ROCK DRILLS
Four medium weight, general purpose Sinkers for hard, deep hole drilling.



THOR #85B ROCK DRILL
Rugged, heavy weight machine for deep down drilling in the hardest rock formations.

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TOOLS

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DIGGERS - SUMP PUMPS
BACKFILL TAMPERS - SAWS
HAMMERS

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BUILD THEM WELL FOR OUR DEFENSE

Through our roads and streets flows the traffic that is the lifeblood of our wartime defense effort. New and better roads are being built and must continue to be built to link important cities and to provide a means of rapid transportation for our vital defense materials, our troops, our munitions and supplies.

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VOLUMES I AND II

By* LAURENCE I. HEWES, *Chief, Western Region, United States Public Roads Administration

covers all these subjects, with no waste words. It starts right in with highway location, and progresses from there to design requirements and principles, grading, landscaping, sand-clay and stabilized roads, macadam roads, gravel and fine-crushed rock roads, and intermediate bituminous surfacings as well as penetration macadam, asphaltic surfacings, concrete roads of various kinds, brick roads and miscellaneous structures.

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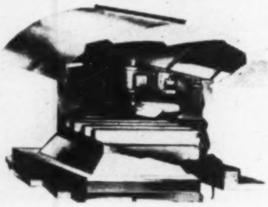
wedge-gate valve. Thus they are instantly changeable with wedge-gate valves, without piping changes. Other features of the new line include "quarter-turn" operation, and a powerful leverage to provide positive, extra-easy opening or shut-off under all conditions. Sizes range from 1½ in. to 10 in., in either semi-steel or steel.—*Homestead Valve Manufacturing Co., Coraopolis, Pa.*

Ventilators

A new series of war plant ventilators for blackout and other factory buildings is announced by Carrier Corp. Designed to prevent transmission and reflection of illumination from the building interior or the reflection of light from the night sky, the Carrier war plant ventilators are available in three types—Carrier exhaust ventilators, Carrier supply ventilators and tempering ventilators. Each of the types described comes in three standard capacities—10,000, 15,000 and 20,000 c.f.m. The units may be used singly or in multiple.—*The Carrier Corp., Syracuse, N. Y.*



Hammer

The Clark renewable tip pulverizer hammer recently announced by the American Manganese Steel Division of the American Brake Shoe & Foundry Co. consists of a weighted manganese steel head connected to the rotor by two matching arms or bars of manganese steel. On the lower end of each bar are hooks which engage internal pockets in the head. It is claimed that this new design

Keep Cylinders at Work

Return empty cylinders promptly to assure an adequate supply of oxygen and acetylene for use in production for victory

THIS CYLINDER CONTAINS
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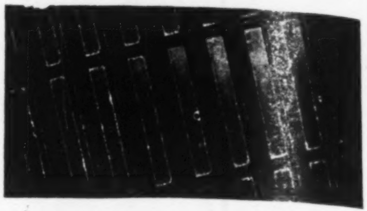
THIS CYLIN
ACETY
CLOSE VALVE
Return Empties Promptly

BATESGRATES
FILLET WELD



Easily maintained . . .

NO CRACKS, JOINTS, CREVICES

Batesgrates are self-cleaning because of peaked, non-skid cross bar. They have no grooves or rough burned metal to catch grease or dirt. Safe traction Batesgrates are strictly one piece — no cuts, slots, or punching. Made from Hexagon Shaped Hot Rolled Steel Bars with smoother, larger, much stronger welds. Send today for engineering Catalog No. 937.

When you need grates
SPECIFY BATES
for long-time economy

WALTER BATES CO.
208 S. LaSalle St., Chicago, Ill.

The Equipment Distributor can conserve your machinery

Valuable equipment, built for years of service, falls short of requirements whenever neglected. New equipment is highly restricted because it takes materials needed so badly for other war purposes. Present equipment can quickly be restored to dependable operating condition by replacement of worn parts. Gorman-Rupp Distributors stock parts for equipment they sell and repair all makes of machines, Mixers, Pumps, Shovels, etc., at reasonable prices. You will help win the war when you conserve valuable equipment by having a Gorman-Rupp Distributor repair it NOW.

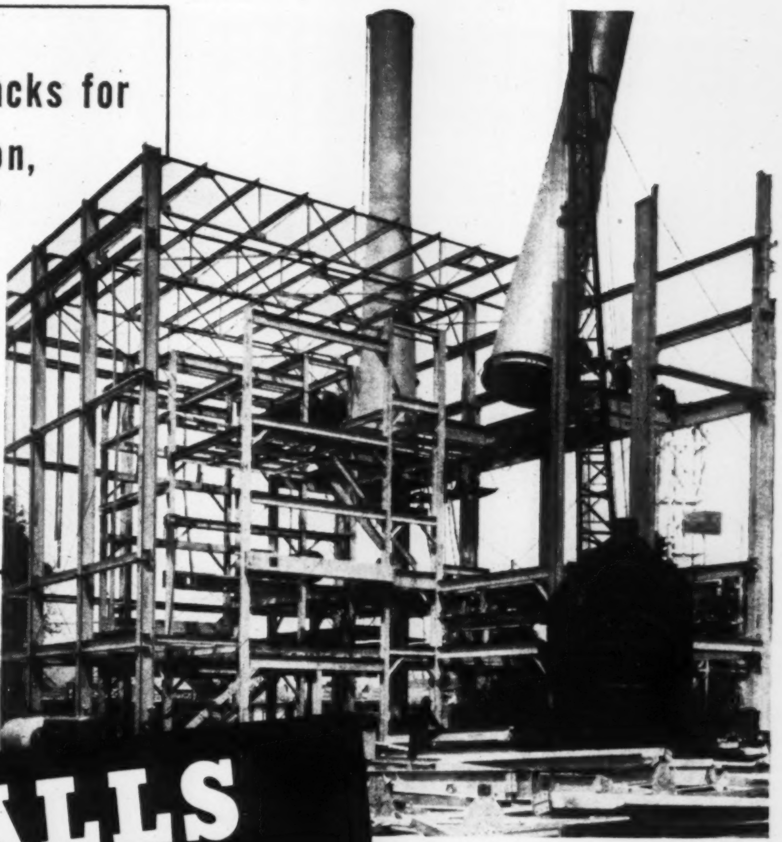
Keep'em Pumpin'

G & R Pumps are not "frozen". All Gorman-Rupp Distributors have them for immediate delivery.

GORMAN-RUPP PUMPS UNSURPASSED FOR PUMPING FAST

THE GORMAN-RUPP CO.
MANSFIELD, OHIO

Power House and Stacks for Masonite Corporation, Laurel, Miss. Ingalls' Complete Fabrication-Erection-and Engineering Service Covers the Nation.



THE INGALLS
IRON WORKS COMPANY
BIRMINGHAM, ALABAMA

Subsidiary Companies and Divisions
THE STEEL CONSTRUCTION COMPANY • THE INGALLS SHIPBUILDING CORPORATION • BIRMINGHAM TANK COMPANY
Shipyards PASCAGOULA, MISSISSIPPI • DECATUR, ALABAMA
Branch Offices NEW YORK • WASHINGTON • PITTSBURGH • ATLANTA • NEW ORLEANS

100% Welded Ship of the Highly Efficient C-3 Class, built by Ingalls. Patterned for Tomorrow in Strength, Speed, Cargo Capacity.

LIGHTNING
IS A TYPE OF
AIR RAID

—BUT YOU CAN EASILY PROTECT VITAL WAR PRODUCTION!

★ An important consideration today is adequate protection of vital war production against hazards of accident and sabotage. The air raids Nature makes with lightning—which can act like either an incendiary bomb or a demolition bomb — can easily be prevented from causing disastrous loss and delay.

West Dodd Lightning Protection and static control equipment is being widely used on Army Ordnance Plants for that reason. It is helping safeguard ammunition loading lines, standard magazines, underground magazines, and bag loading buildings. Many important industrial plants have equipped their power stacks with West Dodd protection.

WEST DODD PLUS FACTORS

The 12 old line manufacturers, including the famous Dodd & Struthers Company, pioneers of modern approved lightning protection, are consolidated in West Dodd. This wealth of experience in building and installing lightning protection, and a long proved record of responsibility, are two plus factors in choosing West Dodd for the job.

The West Dodd end aerial, complete. In center is the exclusive West Dodd cable and point connector. It eliminates sharp bends formerly necessary to bond aerial and conductor. Quicker to install. Eliminates a number of connectors. Simplicity adds to efficiency and longer life.

This is one of many West Dodd items developed to meet U. S. Government requirements, cut installation time, and save labor costs while aiming at more lasting, thorough protection.

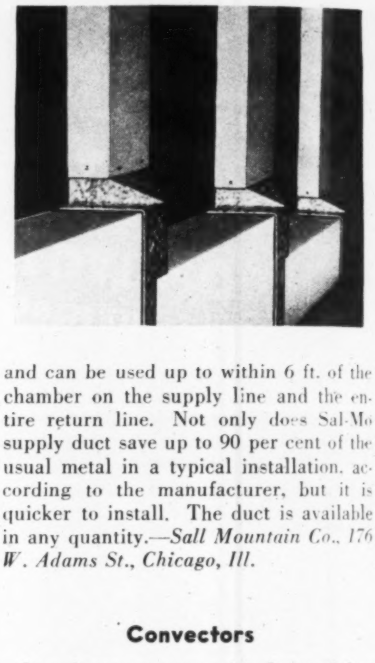
TELEPHONE OR TELEGRAPH TODAY!

WEST DODD
LIGHTNING CONDUCTOR CORP.
GOSHEN, INDIANA

has six distinct advantages: great saving in weight of discarded parts — two-thirds of hammer head can actually be used up before renewing is necessary; time consumed in removing old and replacing new head is negligible; no operating stress is imposed on shank bolt used for assembling; head cannot work loose and come off, and no metal is lost by too early discarding of heads as the maximum use is indicated when lower ends of the arms are visible.—*American Manganese Steel Division, American Brake Shoe & Foundry Co., Chicago Heights, Ill.*

Non-Metallic Duct

Sall Mountain Co. has developed and is now marketing a new, non-metallic supply duct for use in warm air heating and air conditioning systems. This new supply duct is acceptable in residential installations carrying normal temperatures in either gravity or blower types,



and can be used up to within 6 ft. of the chamber on the supply line and the entire return line. Not only does Sal-Mo supply duct save up to 90 per cent of the usual metal in a typical installation, according to the manufacturer, but it is quicker to install. The duct is available in any quantity.—*Sall Mountain Co., 176 W. Adams St., Chicago, Ill.*

Convectors

In order to conserve critical material as suggested by the War Production Board, The Trane Co. has perfected a new non-metallic cabinet convector to be used in place of all-metalic convectors and radiators. Except for the screws, the cabinets are constructed entirely of non-metallic materials. Side and top panels are fabricated from rigid fiber board. Supporting members provided at the corners are of hard wood. The element of the non-metallic cabinet convectors is constructed of steel fins and tubes. The small amount of metal used in these new convectors is equivalent to one-fifth of that used in the ordinary radiator.—*The Trane Co., La Crosse, Wis.*

Concrete Piles for the largest SYNTHETIC RUBBER PLANT completed 28 days ahead of schedule

AND OVER 1,000 TONS OF STEEL SAVED

Group of these piles, driven on close centers . . . rugged columns of compressed, low slump concrete . . . full diameter from top to bottom.

FORD, BACON & DAVIS, Inc., *Engineer-Contractor*

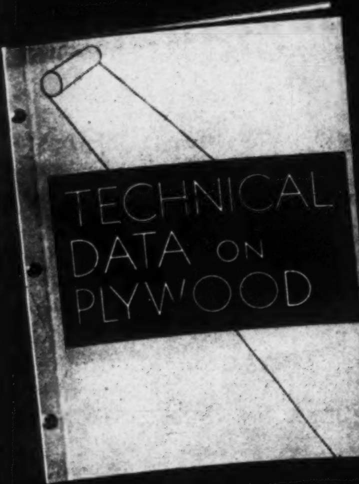
Here are facts for rubber, metal, and time savers. MacArthur completed the foundations, for the largest synthetic rubber plant now being built, twenty-eight (28) days ahead of schedule. Driving compressed cast-in-place concrete piles which require no metal casings, MacArthur saved more than one thousand tons of steel . . . 32 years of successful experience prompts leading architects, engineers, and industrialists to call in MacArthur when foundations are needed. In all cases where MacArthur Compressed Concrete Piles are used, valuable *metal will be released for war needs* . . . not wasted in steel casings left underground.

MacARTHUR

CONCRETE PILE CORPORATION, 18 East 48th Street, New York City
Established 1910

BOSTON: 6 Beacon Street • NEW ORLEANS: 823 Perdido Street • CINCINNATI: 1542 Shenandoah Avenue

Your file should contain this new handbook!



Write for your free copy today!

JUST published are the initial chapters of a new engineering handbook on Douglas Fir Plywood. This is the first time that much of the data on the mechanical properties of Douglas Fir Plywood contained in them has been available to the architect and engineer. You will find that this data will make your designing, specifying and working with plywood easier than ever before.

This handbook is in loose-leaf form, and additional chapters will be sent you as they are completed. Write now for your free copy of *"Technical Data on Plywood"*. Douglas Fir Plywood Association, Tacoma, Washington.

DOUGLAS FIR
PLYWOOD
Real Lumber
MADE LARGER, LIGHTER
SPLIT-PROOF
STRONGER

"A PRODUCT OF AMERICA'S ETERNALLY REPLENISHING FORESTS"

Manufacturer's Activities

Personnel changes and new plans

R. E. Choate, president of the **LaPlant-Choate Mfg. Co., Inc.**, is shown reading a citation of merit as he presented prizes in a contest for war slogans. The prize — a $25 War Savings Bond — went to **Ben Schreckengast**, press brake operator, for the slogan "Let's Better Our Best!" The contest was part of the company's drive to increase production for the war effort.

Albert S. Crandon has been elected executive vice president in charge of factory operations and a member of the board of directors of the **American Window Glass Co.**

Robert H. Morse, Jr., who has been branch manager successively of **Fairbanks, Morse & Co.**'s offices at Cincinnati, Dallas and Boston, has recently become assistant sales manager at the Chicago office.

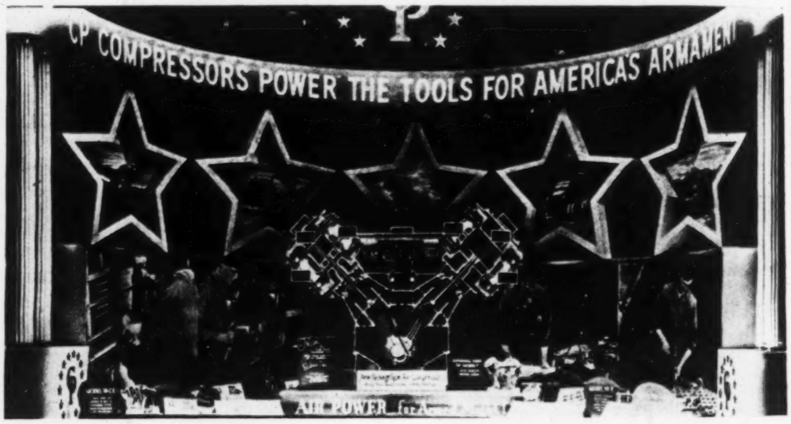
A heavy duty power control unit, No. 25,000-R8C, came off the assembly line recently at the Peoria, Illinois, plant of **R. G. LeTourneau, Inc.** The company says that 25,000 power control units represent more units made and sold than by any other manufacturer.

The **Hays Corp.**, Michigan City, Ind., manufacturers of combustion instruments and controls, have announced the appointment of the **Energy Control Co.** in Philadelphia as distributors.

Ray Hanspeter has been appointed western division sales manager for the **J. D. Adams Co.**, with headquarters at the Indianapolis office.

Three hundred fifty truck drivers of Albany, N. Y., were the first in the nation to enroll in the U. S. Truck Conservation Corps, pledged to keep America's trucks rolling, sponsored by **Mack Trucks, Inc.**

Lt. J. L. Rhynard is in command of the first group of 39 non-commissioned Army Ordnance officers who graduated recently from the **General Motor Corp.**'s new training school in Detroit. Selected because of their past experience in military vehicle maintenance, the GMC training was to thoroughly familiarize them with design, service details and maintenance of all parts and assemblies in the company's military trucks. Similar courses can be given to 30 commissioned or noncommissioned officers every two weeks.



With no stock of finished machines on hand, nor sufficient raw materials available, to display its newest type air compressor, **Chicago Pneumatic Tool Co.** recently constructed a full size working model out of cardboard to become the focal point in its latest educational exhibit at its New York office. By means of "flasher" lighting, the opening of the valves and the cycle of operation are cleared followed in the cutaway section of the company's type "Y" compressor. The important role air compressors play in the war effort is conveyed to an estimated 10,000 people who see the display daily by a photo mural depicting pneumatic tools in use, and also picturing the finished products these tools help to build.

MEDUSA WHITE
PORTLAND CEMENT
NON - STAINING
MEDUSA PORTLAND CEMENT CO. CLEVELAND, OHIO
REG. U.S. PAT. OFF.
94 LBS. NET
NON - STAINING
PORTLAND CEMENT
MEDUSA WHITE
MEDUSA

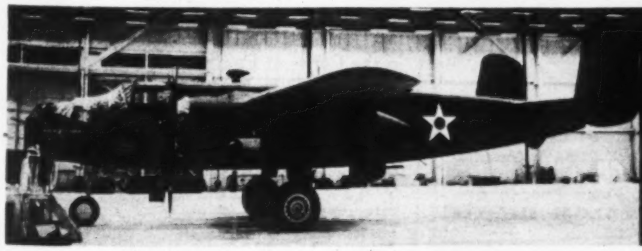
a basis for selecting WHITE CEMENT FOR FLOORS

The original white portland cement with a 35 YEAR service record

White cement floors for bomber or other war production plants are new. The white cement, however, used for making these floors is not new. Medusa White, the original white portland cement, was first made in 1907. Since that time it has been widely used all over the world in stucco, cast stone, terrazzo, and cement tile. Medusa White has the longest service record of any white cement. Its superior qualities have been proved for 35 years.

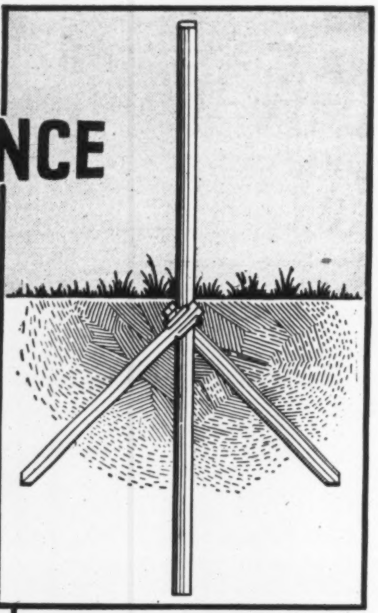
In view of the above facts, is it any wonder that engineers and architects building these new white cement floors turn to Medusa White. Since the main purpose of a white cement floor is for light reflection, and since Medusa White has proved its superior white quality, then it is only logical to select Medusa White for this all-important war use. Our engineers are ready to cooperate with you on any installation using this time-tested original White Portland Cement.

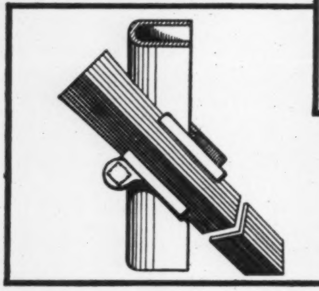
MEDUSA PORTLAND CEMENT CO.
1001 MIDLAND BLDG. • CLEVELAND, OHIO



MEDUSA

White Portland Cement





Why

ANCHOR FENCE

STANDS RIGID IN ANY SOIL!

with exclusive, patented

"DRIVE ANCHOR" POST FOUNDATIONS

Posts and anchors are *driven* deep into the solid sub-soil. The angle-shaped anchors extend at right angles to the fence-line, and are clamped to the post to form a *three-point* "tree-root" anchorage. Strain severe enough to bend the posts will not shift the anchorage.

The first chain link fence in America, installed by Anchor in 1907 with "drive anchor" post foundations, is still erect and in line, solid despite the years. Your fence can be installed with exclusive "drive anchors" in *any* weather, in any soil, even in frozen ground. In case of plant expansion the fence can be moved without loss of post foundations. Get facts about "drive anchors." See how they give extra protection, long life, low maintenance costs. Write for Catalog, and name of nearest Anchor Fence Engineer. Anchor Post Fence Co., 6665 Eastern Avenue, Baltimore, Md.

1892 - 1942
Fifty Years of Service

Nation-Wide Sales
and Erecting Service

ANCHOR
FENCE

MITCO
OPEN STEEL FLOORING

Pressure Formed
90% Open Area
Easy to Install

Hendrick Manufacturing Company
45 Dundaff Street, Carbondale, Pa.

DE L'AVAL STEAM TURBINE CO.
TRENTON, N.J.

Manufacturers of
STEAM TURBINES . . . HELICAL and WORM GEARS . . . PUMPS: Centrifugal, Propeller, Clogless, Mixed Flow, Rotary Oil . . . Pump Priming Systems . . . CENTRIFUGAL BLOWERS and COMPRESSORS.

William J. Palmer, works manager of the Elizabeth, N. J., plant of the **Phelps Dodge Copper Products Corp.**, was on hand to receive a new joint Army-Navy "E" pennant on behalf of the workers recently. The pennant was one of four presented to the company within a short time—the other plants receiving the pennant included those at Fort Wayne, Ind.; and Yonkers, N. Y.

Anthony Anable, a member of the **Dorr Company's** staff since 1923, has been commissioned a lieutenant commander in the U. S. Naval Reserve and reported for active service.

F. W. Grant has resigned as president of **Atlas Plant Extension Ltd.**, of Toronto, and has been succeeded by **John R. Read**, president of **Canadian Westinghouse Co., Ltd.**

The **Cochrane Corporation** of Philadelphia, Pa., has announced the appointment of the **Energy Control Company** of 3107 No. Broad St., Philadelphia, as flow meter representative for Eastern Pennsylvania, Southern New Jersey, Delaware and Maryland.

Harold W. Sweatt, president of **Minneapolis - Honeywell Regulator Co.**, recently accepted a joint Army-Navy "E" in behalf of his company. The company was awarded the coveted flag for its production of high precision military instruments for the armed forces. Employees and their families attended the ceremonies.

John Flood & Sons, St. John, N. B., which has been active in execution of war contracts since the start of the war, is celebrating its 95th year of activity as general contractors and engineers.

Oscar P. Cleaver, for 12 years a lighting engineer with the Lamp Division of **Westinghouse Electric & Manufacturing Co.**, has been commissioned a captain in the Corps of Engineers.

Howard S. Welch has been elected president of **Eisemann Magneto Corp.**

The Trimble Co. has been organized in Pittsburgh, Pa., to succeed the **W. F. Trimble & Sons Co.** in the general construction field. All buildings and equipment of the old company were purchased by the new concern. W. F. TRIMBLE, JR., is president. Other officers are: R. M. TOTTEN and R. J. MITCHELL, vice presidents, and S. A. ROBINSON, treasurer.

The STRAN-STEEL DIVISION of the GREAT LAKES STEEL CORP. announced a change in its Detroit office address from 607 Shelby Street to Suite 1130 Penobscot Bldg.

LEO F. HELLER, former secretary of the Youngstown, Ohio, Builders Association, has been appointed director of labor relations for the AMERICAN SHIPBUILDING CO.

DAVIS H. KEMPLER (left) who has supervised the installation of automatic tabulation systems for payroll, time-cost and social security records of more than 30,000 construction workers and engineers in the Great Lakes and the Middle West, has been named general auditor of THE AUSTIN CO. GEORGE A. BRYANT (right) president of the national engineering and construction organization, said recently that Mr. Kempler's modern procedure has saved tens of thousands of dollars on war projects to date, and has reduced the personnel required to keep such records by as much as 40 per cent.

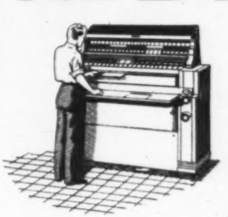
HUGO D. SHARP, 57, since 1921 New England manager of the electrical, wire rope and construction materials department of the AMERICAN STEEL & WIRE CO., Boston, Mass., died at Sutton, Mass., recently.

JOSEPH E. MOODY has been named manager of industrial relations for the YORK ICE MACHINERY CORP.

WILLIAM N. GROOMS, Salt Lake City, Utah, has been appointed district sales agent for the ROLLER-SMITH CO., of Bethlehem, Pa. Mr. Grooms will handle all Roller-Smith products in the states of Utah, Idaho, Montana and the southwest corner of Wyoming.

The first small-arms ammunition plant in the country to receive the "E" pennant from the Army and Navy as an award for its production went to the Lake City ordnance plant, in Missouri, recently.

WHEN CHANGES MUST BE QUICK...
USE BW PRINTS!



THESE ARE DAYS of quick changes in products—of new designs to cut down the use of critical metals, or to meet new war needs. And these days, especially, Bruning Black and White (black line) prints can speed that work enormously!

First of all, Bruning BW prints are made much more quickly than blue prints. They need no time-wasting washing and drying. They are ready for use *immediately*—when and where you want them. Secondly, BW prints, with their white backgrounds, make notations and changes *easy to see*—avoid confusion and mistakes. And third, BW prints can be produced in large volume with a single operator—instead of the two or three men that blue printing requires.

Get ALL the facts about the Bruning BW process—and about the BW printing and developing equipment that can make the wheels hum faster in YOUR plant! Write for FREE booklet. Charles Bruning Company, Inc.

2076-255

Since 1897 BRUNING

SPEEDS—SIMPLIFIES—AND PROTECTS A NATION'S DRAFTING

NEW YORK • CHICAGO • LOS ANGELES

Branches in 14 Principal Cities

Speed

a must for war work -that's why you need

SMITH AIR COMPRESSORS

★ Lightweight ★ Flexible ★ Move them easily from one job to another

Here's a way to speed-up your work—to save money! Replace large, cumbersome compressors with lightweight Smiths for a majority of compressor operations. 60 cu. ft. size uses only 1 gal. of gasoline an hour. Made with FORD MOTORS and standard parts, the ruggedness and efficiency of these famous compressors are sources of constant satisfaction to users everywhere. Wire, phone or write today for complete information!

With a Ford Motor and shop facilities you can assemble your own Smith Compressor. We will furnish a Smith Compressor Head and Accessories with complete instructions for mounting.

Write for free Booklet

GORDON-SMITH & CO.
INCORPORATED
430 College St., Bowling Green, Ky.

The plant was converted from farmland to a giant arsenal within a few months, and began production less than a year ago.

William F. Kinsella, 59, vice president and treasurer of the Worden-Allen Steel Co., of Milwaukee, Wis., died recently.

The Greenfield Tap & Die Corp., of Greenfield, Mass., recently was awarded the Army-Navy "E" pennant for excellence in production.

The former Ransome Concrete Machinery Co. of Dunellen, N. J., is to be known as the Ransome Machinery Co. The company will continue to manufacture the same products with which it has been identified in the past—34-E single and dual drum pavers, truck mixers, central plant mixers and small mixers.

Dave Cottrell, Mississippi Power Co., director and head of the company's new industries division, died at Meridian, Miss., recently.

George Metzger, with a record of 72 years of service with Henry Disston & Sons, Inc., of Philadelphia, recently was a participant in ceremonies where all the oldest employees in the company were introduced to young army and navy flyers and other service men who benefit by the company's product. Mr. Metzger, 85 years old, is an active member of the saw-making department.

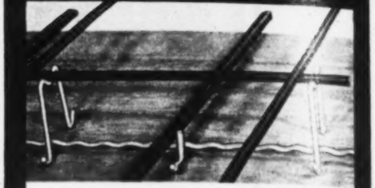
Vacuum Concrete, Inc., of Philadelphia, Pa., has appointed the Hunter Tractor and Machinery Co. of 327 S. 16th St., Milwaukee, Wis., as sales agents in the Wisconsin territory.

Frederick Lee Stone, 66, vice president of Universal Atlas Cement Co., died at Rochester, Minn., recently.

Christian G. Norman, chairman of the board of governors of the Building Trade Employers' Association, has been appointed general chairman of the New York City Building and Construction Salvage Division of the War Production Board.

The Commercial Credit Company of Baltimore, and the Kaydon Engineering Corp. of Muskegon, Mich., has been merged. According to A. E. Duncan, Chairman of the Board of Commercial Credit, the action was taken in conformance with the company's decision to

INSTALL FASTER... LOWER COSTS with



★ UNION ★

COMBINATION SLAB BOLSTER AND CONTINUOUS HI-CHAIR

Unit supported on 5" centers. Hi-Chairs a minimum of 2" high. Available in 5' or 10' lengths. Complies with Federal specifications.

Specify U. S. 573

Specialties

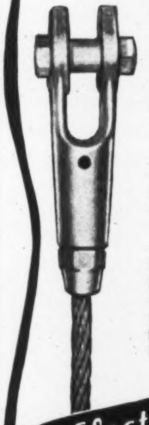
Hi-Chair, Screed Chairs • Bar Spacers, Beam and Slab • Ceiling Inserts • Shelf Angle Supports • Bar Ties, Wall Ties • Reed Clip Beam Wrapping, • Sleeper Anchors • Paving Jont Units

Wide variety of designs for special uses. Wrte for catalog. See Sweets, Sec. 3-52.

UNION STEEL
Products Company
417 Pine St.
Albion, Michigan

SEE OUR CATALOG IN SWEET'S

TIGHT BITE ..holds tight!

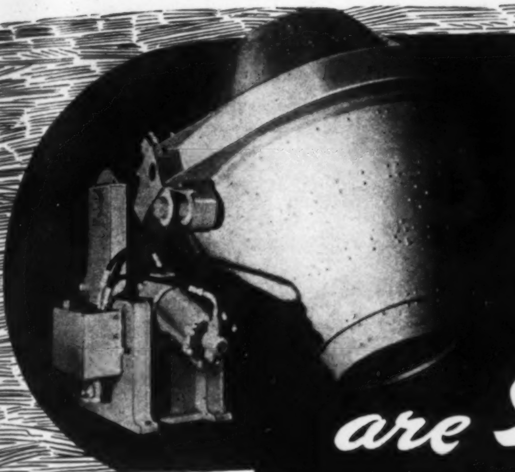


Electroline-Fiege Wire Rope Connectors hold with a "Bulldog Grip" because their special design gives them a tighter bite. They are easy to install, streamlined and prevent dangers from undamped vibrations which causo crystallization, frayed cables and failures. Full rated cable strength in every connection.

Prove to yourself that they are better and why many leading wire rope users have made them standard on jobs where performances must not fail. Write today for complete details and the booklet, "Positive Grip".

Electroline FIEGE CONNECTORS

Electroline Company
4004 South La Salle Street Chicago, Illinois



15 TVA DAMS are SMITH-MIXED!

TVA DAMS
Poured by Smith Mixers:

- WILSON
- WATTS BAR
- FORT LOUDOUN
- DOUGLAS
- CHEROKEE
- NORRIS
- FONTANA
- CHEOAH
- CALDERWOOD
- SANTEETLAH
- HIWASSEE
- APALACHIA
- BLUE RIDGE
- OCOEE No. 1
- OCOEE No. 2

SMITH

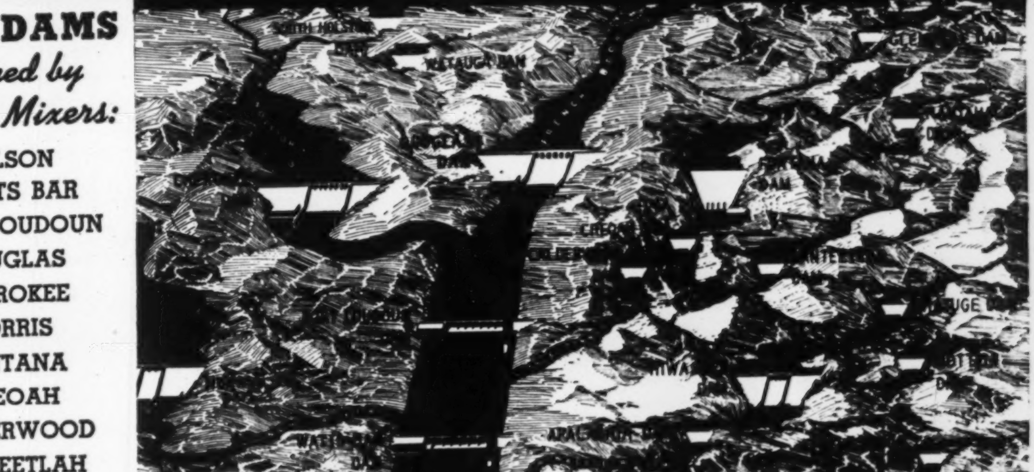

SOUTH HOLSTON DAM
WATAUGA DAM
WATTS BAR DAM
CHICKAMAUGA DAM
HALES BAR DAM
GUNTERSVILLE DAM
WHEELER DAM
WILSON DAM
PICKWICK DAM
TENNESSEE RIVER
KENTUCKY DAM
OCOEE DAMS

Diagram of TVA Water Control System

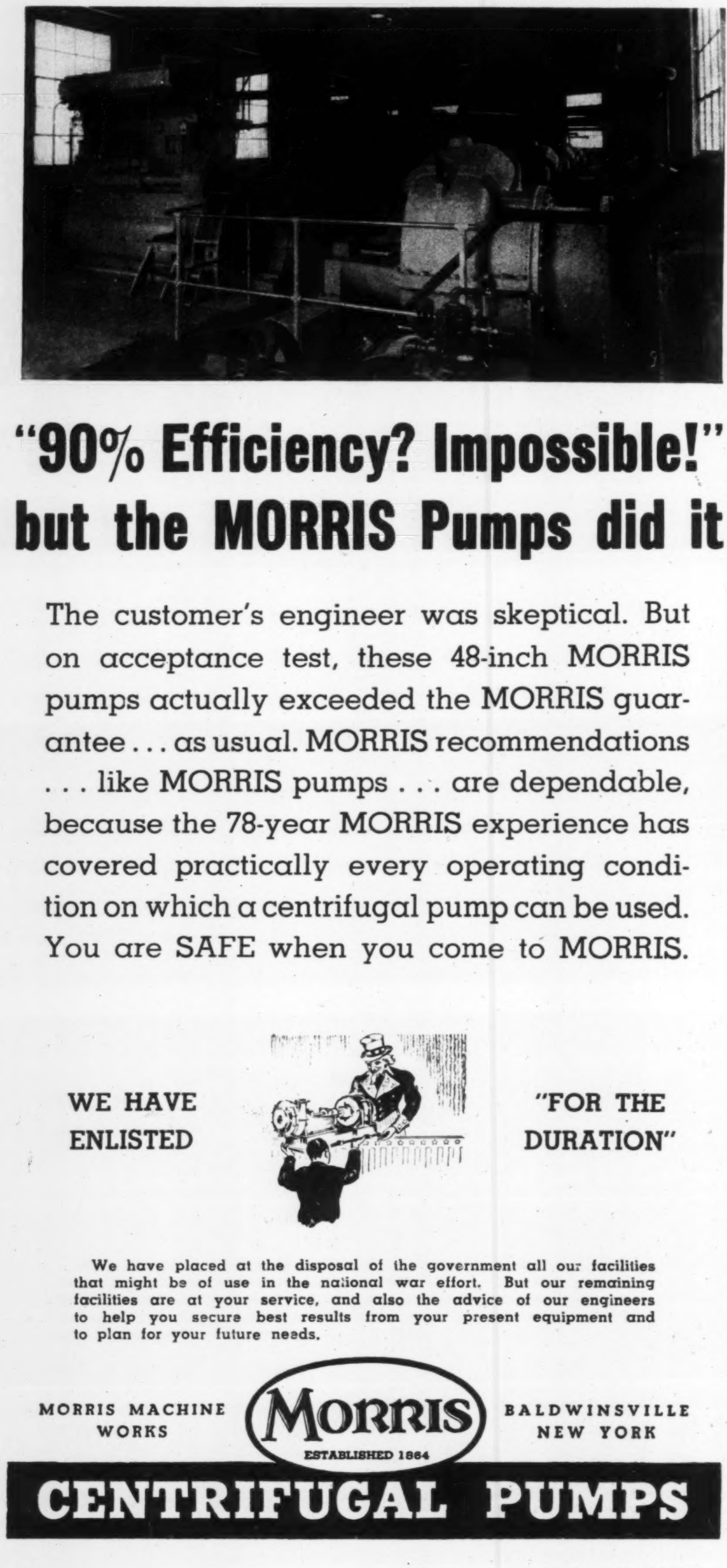
Nation's Largest Construction Program Calls for Millions of Yards of Concrete

Work on TVA's Water Control system —*the largest construction program ever undertaken in the United States* — is progressing rapidly, thanks to the highly efficient TVA organization, plus well-designed, dependable equipment. Significant is the fact that fifteen TVA Dams are Smith-Mixed. Smith Tilting Mixers again have proved their inherent speed, efficiency and reliability — a reputation achieved over a period of 42 years on the world's greatest engineering projects — Boulder Dam, Panama Canal, San Francisco-Oakland Bridge, etc., etc.

The T. L. SMITH CO.
2855 North 32nd Street • Milwaukee, Wisconsin

SMITH MIXERS

USED ON THE WORLD'S GREATEST CONCRETE PROJECTS



"90% Efficiency? Impossible!" but the MORRIS Pumps did it

The customer's engineer was skeptical. But on acceptance test, these 48-inch MORRIS pumps actually exceeded the MORRIS guarantee . . . as usual. MORRIS recommendations . . . like MORRIS pumps . . . are dependable, because the 78-year MORRIS experience has covered practically every operating condition on which a centrifugal pump can be used. You are SAFE when you come to MORRIS.

WE HAVE ENLISTED "FOR THE DURATION"

We have placed at the disposal of the government all our facilities that might be of use in the national war effort. But our remaining facilities are at your service, and also the advice of our engineers to help you secure best results from your present equipment and to plan for your future needs.

MORRIS MACHINE WORKS
MORRIS
ESTABLISHED 1864
BALDWINSVILLE NEW YORK

CENTRIFUGAL PUMPS

devote a portion of its large resources to financing the production of war materials. A. H. **Frauenthal**, president of the Kaydon Company, continues in his office as does **Frank J. Donovan**, secretary-treasurer.

Harry J. Leschen, president of the **A. Leschen & Sons Rope Co.** of St. Louis, Missouri, died recently.

The **Aluminum Ladder Co.** of Tarentum, Pa., has moved its plant and equipment to Worthington, Pa., where the firm now occupies the group of buildings formerly operated by the Buffalo Woolen Mills.

Leonard Wesson, operating manager for the **Universal Atlas Cement Co.**, died recently at White Plains, N. Y.

Sonoco Products Co., of Hartsville, S. C., has been commended by the Treasury Department for reaching the figure of ten percent of the company's gross payroll voluntarily diverted to the purchase of War Savings Bonds.

Harold C. Ryder, 59, advertising and sales promotion manager of the **Hayward Co.**, of New York, died recently at his home in Hollis, L. I. An employee of the Hayward Co. since 1907, he had been a member of the sales department until his appointment as advertising and sales promotion manager.

Hugo E. Becker, a **Westinghouse** sales engineer on the Pacific Coast since 1925, has been appointed supervisor of the newly created maintenance sales department for the company's Pacific Coast district. In his new post, Mr. Becker will coordinate the work of three major maintenance divisions of the company—renewal parts, field engineering and repair plants—to minimize breakdown outages and insure uninterrupted production in industrial plants.

Animated displays originally created to promote the health and vitamin-protection features of **General Electric** refrigerators are now being offered without charge on a loan basis for use in promoting national nutrition, it is announced by Glenn Gundell, advertising manager of the General Electric Co.'s appliance and merchandise department at Bridgeport, Conn. General Electric suggests ways in which these displays can be used.

J. A. **Salat** has been appointed manager of the **Duke Equipment Co.**, of Mont-

Don't Neglect Asphalt Pavements!

A Universal Twin Dryer Portable Asphalt Plant Cuts Patching Time and Costs! . . .

It's important to keep asphalt pavements in good condition now when tires need road protection.

Though it may not be possible to resurface asphalt streets and roads to any great extent at this time, you can pave stretches that need repairs badly, and apply hot patches where needed with asphalt produced fast and at low cost the Universal "Twin Dryer" way!

This compact, portable plant does everything a big, stationary, "capital investment" asphalt producing plant does, but on a smaller scale. Sand and aggregates are thoroughly dried by the two rotating dryers. Hot asphalt is introduced under pressure. Thorough mixing and penetration are provided by the screw type pug mill. Easily towed from pit to pit or stockpiles. Set up ready to go in only a few minutes. Send for the facts in Bulletin No. 57.

A User Reports

"We recently produced 42 tons of mixed asphalt per hour on a street job, under favorable conditions, using 10 to 11 gallons of MC-2 asphalt road oil, costing only a few cents per gallon, to one ton of aggregates." The Universal "Twin Dryer" will help to keep 'em rolling over inexpensively maintained asphalt roads.

Another "direct hit" is the Universal Spreaderoller — the cost-cutting, self-propelled, seal coating machine that spreads material in three layers and rolls it smooth and firm simultaneously. They are speeding airport apron and runway, and military road construction in the U. S. and Canada. The facts are all in Bulletin 800-A!

UNIVERSAL CRUSHER CO.
633 C Avenue, West
Cedar Rapids, Iowa

UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS real, Que., construction machinery representatives and suppliers to war industries. Mr. Salat has been office manager for the company for the past nine years, and is familiar with contractors' equipment requirements.

The executive sales office of the Columbia chemical division of the **Pittsburgh Plate Glass Co.** has been moved to Pittsburgh from New York. The move is a continuation of the company's program of coordinating its various divisions in the general office at Pittsburgh.

J. T. Callahan, with the **B. F. Goodrich Co.** since 1928, has been named western district manager of the company's national sales and service division, with headquarters in Chicago, Ill. Mr. Callahan succeeds **Walter W. Thomen**, who recently was called to active service as a major in the office of the Chief of Ordnance, War Department.

P. W. Seyl, 67, who was for 24 years manager of the American Bridge Co.'s Gary, Ind., plant, died recently at Gary. **L. J. Turner**, manager of the Griffin, Ga., branch of the **Georgia Natural Gas Co.**, has been transferred to the Brunswick office.

Wharton Clay, secretary of the **National Mineral Wool Association**, is shown as he took part in a recent radio program discussing details of the government's campaign to encourage home insulation as a necessary fuel conservation measure. He mentioned that a government booklet, sponsored by the Office of War Information, OPA, OPC and the War Production Board is now available, stressing the urgency of applying insulation and other recommended means to forestall the effects of possible fuel shortages this winter.

August Roth, chief engineer for **Spear & Co.**, Pittsburgh, recently received a citation from the company for 25 years of continuous service.

A recent reorganization of the **Marmon-Herrington Co.**, Indianapolis, brought **Bert Dingley**, former executive vice-president, into the chair as president, and continued Mr. A. W. **Herrington** in the office as chairman of the board of directors.

William J. O'Connor, 66, president of the **Predergast Lumber Company** of St. Louis, Missouri, died recently.

The **Kinney Manufacturing Co.** of Bos-

CONTINENTAL BULLETIN

THIS CONFIDENCE MUST BE MAINTAINED

Just because bombers, pursuit ships, tanks or PT boats do not roll from our assembly lines, let's not forget that production schedules for those fighting craft would be thrown "all out of whack" if Continental rubber parts did not come through on time.

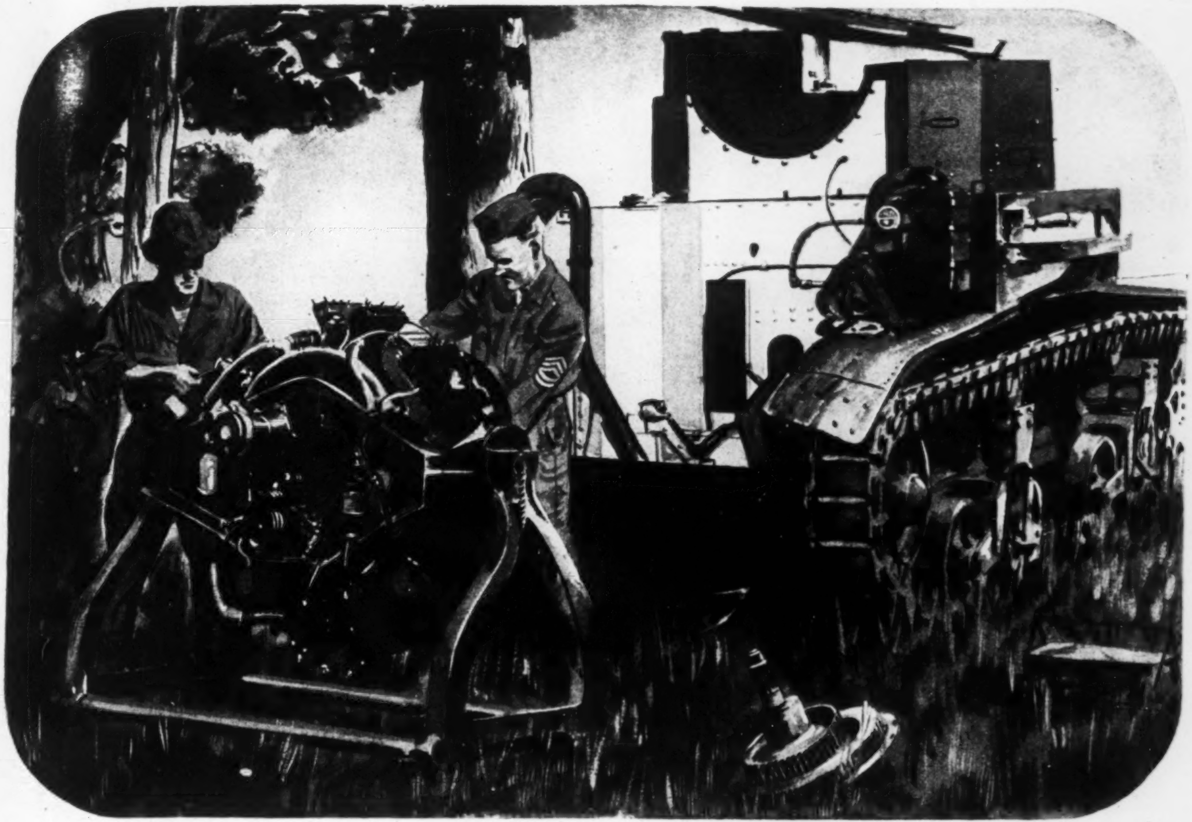
Fortunately, we of Continental have specialized in meeting sudden and unusual requirements for so many years that we are meeting these war demands with exceptional promptness and accuracy. These crucial war industries have the same confidence in us which civilian users of industrial rubber goods have had in the years gone by—a confidence that is up to us to maintain......at all costs.

From Factory Bulletin Board of the
CONTINENTAL RUBBER WORKS
MAKERS OF THE VITALIC LINE SINCE 1903
ERIE, PA., U.S.A.

THE HAND OF THE SPECIALIST IS OFT REVEALED IN LITTLE THINGS*
*of BIG importance

NEPTUNE
METER COMPANY
THE
WORLD'S LARGEST
MAKERS OF
LIQUID METERS
1892 . . . 1942
50 West 50th St., New York City
Branches in Principal American Cities
and in Canada
Trident Meters

THE MOUNT VERNON
BRIDGE CO.
Engineers Contractors
STRUCTURAL STEEL
RAILWAY AND HIGHWAY
BRIDGES
BUILDINGS AND VIADUCTS
MOUNT VERNON, OHIO



His old job IS YOUR JOB NOW

● That boy who had the knack of keeping even your most overworked machine "ticking" is probably now using that knack in the interest of Uncle Sam. Yet never before has it been so important to keep your equipment working at top efficiency.

You who own Austin-Western equipment have the advantage of the extra durability that's built into it. You don't have to baby A-W machines. But you can't hope to get the most out of even the most rugged machines unless you have them serviced promptly and regularly . . . by men who know exactly what to do . . . when and where to do it.

Your nearby A-W dealer has this know-how . . . and the equipment to do a thorough job with a minimum of lay-up time for the machines. Consult him for helpful, constructive suggestions on simple service steps that will prevent many breakdowns, and help keep old machinery performing with new machine efficiency. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.

CONSULT YOUR NEARBY A-W DEALER FOR ADVICE ON CONSERVING YOUR MACHINERY

Austin-Western

MOTOR GRADERS • BLADE GRADERS • ELEVATING GRADERS • SCRAPERS • CRUSHING AND SCREENING PLANTS • ROLLERS ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES • SCARIFIERS • DUMP CARS • TRAIL CARS

DURABLE
ADAPTABLE
AVAILABLE
REX-WELD
flexible
Metal
hose

Both Steel and Bronze

The Immediate Solution to Your Flexible Connection Problems!

Type RW-81 (annular corrugations)

Type RW-91 (helical corrugations)

REX-WELD (corrugated) Flexible METAL Hose

Sizes from 1/8" I. D. to 4" I. D. inc. Pressures to 14,500 p.s.i. Temperatures to 1000° F. One-piece, all-metal construction. Continuous lengths to 50 feet.

Rex-Tite Mechanical (Re-attachable) couplings; solder couplings; brazed and welded couplings and flange assemblies for Rex-Weld Flexible Metal Hose. *Complete data on request.*

Use our production capacity to increase your production

CHICAGO METAL HOSE CORPORATION
General Offices: MAYWOOD, ILLINOIS
Factories: Maywood and Elgin, Illinois

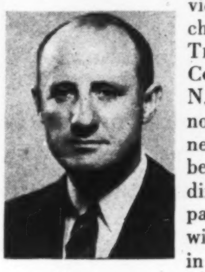
ton, Mass., announced the closing of its district office at Dallas, Texas, last month.

Robert Lytle, an employee in the power house of the **Wickwire Spencer Steel Co.** Buffalo, N. Y. plant, recently was awarded first prize of a $100 war bond for his slogan "I Pull with Uncle Sam!"

Glenn Rippey, for the past ten years field engineer for the **Portland Cement Association** in Tulsa and northeastern Oklahoma, has been appointed district engineer with headquarters in Oklahoma City.

Farnham Yardley, 73-year-old president of **Jenkins Bros.**, manufacturers of valves, was busy signing autographs when this picture was taken during ceremonies attendant to the presentation of joint Army-Navy "E" award for excellence in the production of war materials.

Udell C. Young, vice president of **General Foods Corp.** in charge of production, has announced the retirement of **Harry W. Brown**, manager of the company's eastern plants. **Elmer J. Grimmett**, chief engineer, will succeed Mr. Brown.



Appointment of **James R. Connell** as vice president in charge of sales of **The Fibre Conduit Co.** of Orangeburg, N. Y., has been announced. Mr. Connell has been a member of the board of directors of the company since 1939, and will continue to serve in this post. He resigned as a partner in charge of the New York office of **Kebbon McCormick & Co.**, to join the Fibre Conduit Co.

A roster of its entire membership, together with the names of 1151 manufacturers represented, has been prepared by the **Associated Equipment Distributors** for distribution to persons and firms connected with the construction machinery industry. The associations' 433 regular, associate and allied members (as of July 15) are listed alphabetically, with address, phone number, contact man and branches. The regular and associate members are also listed by states in each of the twelve AED Directoral Regions.

Serving and Conserving

MAINTENANCE-THRIFTY CONCRETE ROADS

America's 100,000 miles of concrete roads are *conserving millions of man-hours of road labor, countless tons of maintenance materials and large quantities of equipment and transportation needed for war.*

Maintenance funds go 1½ to 5½ times farther on concrete. The saving over other surface types ranges from $57 to $444 per mile per year, according to a summary of available state highway cost records for recent years.

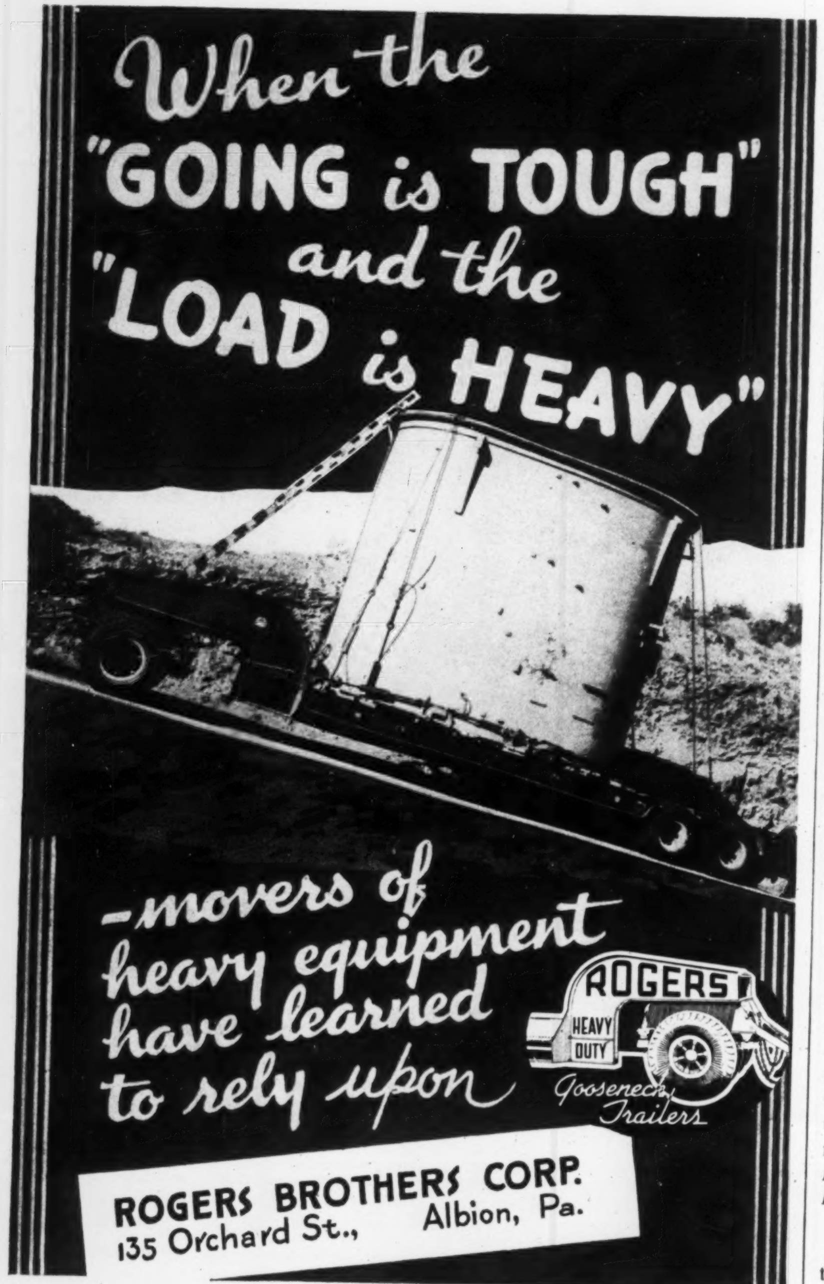
This is particularly significant because concrete roads in general carry the heaviest traffic.

For today's main-traveled military and access roads, concrete gives the needed load capacity at lowest first cost—requires a minimum of critical materials and transportation in construction—saves money, labor, materials and transportation in maintenance.

Our technical staff is available to assist war construction designers and builders, to expedite work and to develop pavement designs of adequate load-carrying capacity using a minimum of critical materials.

PORTLAND CEMENT ASSOCIATION
Dept. 9b-17, 33 W. Grand Ave., Chicago, Ill.

BUY WAR SAVINGS STAMPS AND BONDS



ROGERS BROTHERS CORP.
135 Orchard St., Albion, Pa.

Hayward Buckets

Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.

THE HAYWARD CO., 48-50 Church St., N. Y.

BELMONT IRON WORKS
PHILADELPHIA ROYERSFORD EDDYSTONE

Fabricators *Contractors*
Exporters

STRUCTURAL STEEL
BUILDING & BRIDGES
RIVETED—ARC WELDED
BELMONT INTERLOCKING
CHANNEL FLOOR

Main Office
Philadelphia, Pa.

44 Whitehall St
New York Office

NEW PUBLICATIONS

Fluorescent Accessories—A [illegible] page catalog on G-E fluorescent accessories is announced by General Electric's appliance and merchandise department. The catalog contains general and technical information on fluorescent lighting principles. It gives complete descriptions of the many G-E fluorescent lampholders, starters, starter sockets, etc., together with detailed stories on how these accessories operate, why they are necessary and how accessories of high quality can fit into the economy of operation of fluorescent lighting.—*The General Electric Appliance and Merchandise Department, Bridgeport, Conn.*

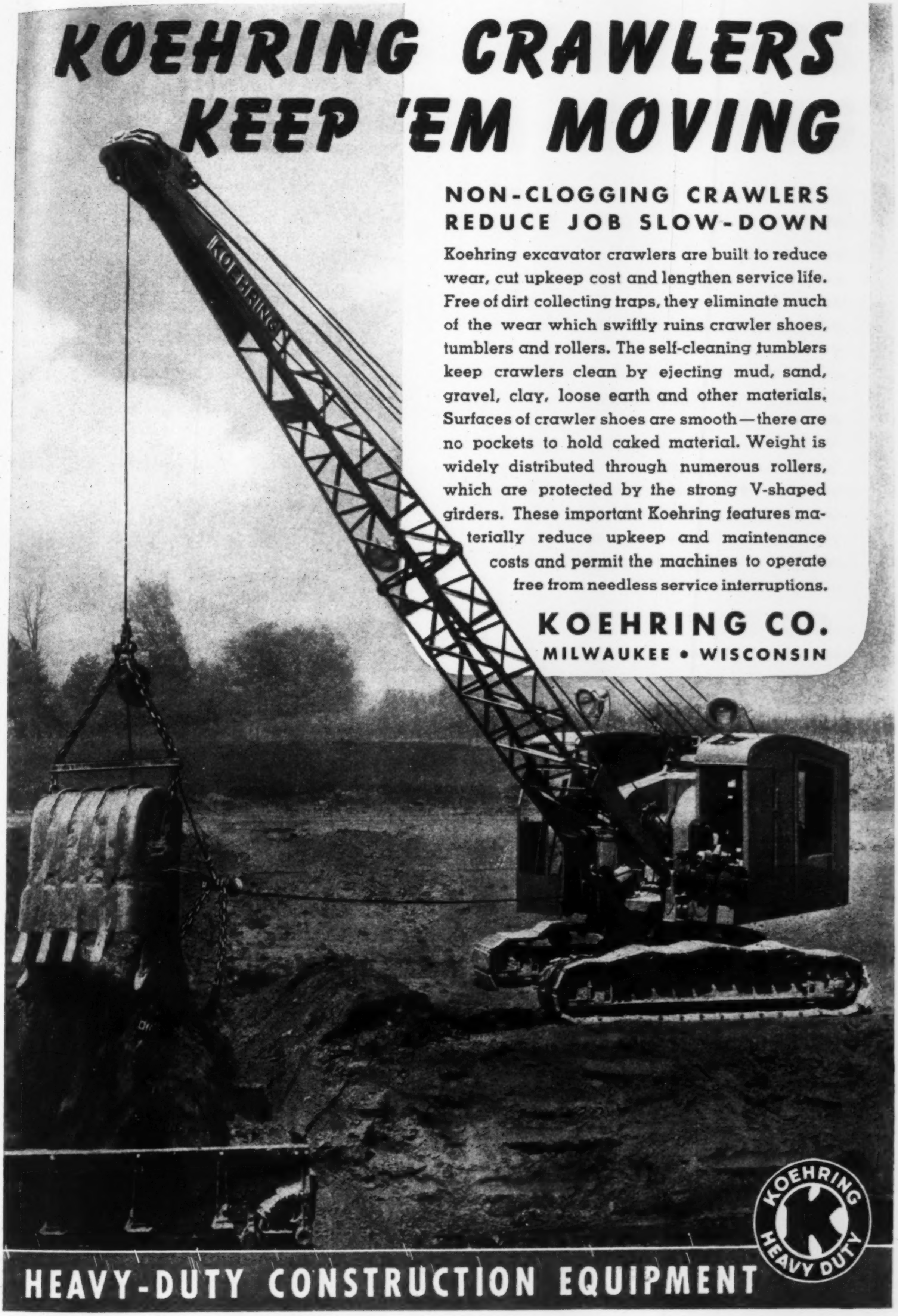
Glue—"Laucks Glues for War" is the title of an informative new illustrated 4-page broadside published by the I. F. Laucks, Inc., detailing how wood and glue are alternating for steel in the production of vital war materials. Wood and glue's large part in the present conflict is confined not only to the prefabricated housing field, but is out in the line of fire in wood-and-glue airplanes, wood-and-glue ships, etc. The booklet also shows simplified methods of glue mixing and application as perfected by the company.—*I. F. Laucks, Inc., Maritime Bldg., Seattle, Wash.*

Savings—Saving critical materials, transportation and time is the subject matter of the latest Dravo bulletin No. 506—"Dravo Direct-Fired Heaters". Tabulations are presented which cover comparative savings in metals, by weight and monetary cost. Based on approximately the same required B.t.u. output per hour, tables also show less floor space requirements for Dravo heater systems.—*The Dravo Corp., Heater Department, Dravo Bldg., Pittsburgh, Pa.*

Cooling Fan—A new folder describing the new Hartzite cooling tower fan tells of a product just being placed on the market. Its reinforced plastic blade replaces a blade of aluminum which has been on the market for many years. Aluminum blades of so large a size are no longer available. The development of the plastic blade is said to be in many ways an improvement over aluminum.—*Hartzell Propeller Fan Co., Pique, Ohio.*

Specifications—A set of sheets giving complete specifications on engines manufactured by the Hill Diesel Engine Co., a subsidiary of the Rogers Diesel and Aircraft Corp., have been made available.—*Hill Diesel Engine Co., Lansing, Mich.*

Vibrating Screen—A new bulletin just released by the Robins Conveying Belt



KOEHRING CRAWLERS KEEP 'EM MOVING

NON-CLOGGING CRAWLERS REDUCE JOB SLOW-DOWN

Koehring excavator crawlers are built to reduce wear, cut upkeep cost and lengthen service life. Free of dirt collecting traps, they eliminate much of the wear which swiftly ruins crawler shoes, tumblers and rollers. The self-cleaning tumblers keep crawlers clean by ejecting mud, sand, gravel, clay, loose earth and other materials. Surfaces of crawler shoes are smooth—there are no pockets to hold caked material. Weight is widely distributed through numerous rollers, which are protected by the strong V-shaped girders. These important Koehring features materially reduce upkeep and maintenance costs and permit the machines to operate free from needless service interruptions.

KOEHRING CO.
MILWAUKEE • WISCONSIN

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

KERLOW
FREE BULLETIN Write for your copy today

SAFE FOOTING

. . . a MUST for war workmen

Insecure footing and insufficient light often put men out of action in the battle of production . . . but those who walk on Kerlow Open Steel Flooring are as sure-footed as a Mexican burro. This strong, economical, wear-resistant grating allows ample passage of light, heat and air. It is slip-proof in all directions and doesn't collect grease, rubbish or dirt.

KERLOW STEEL FLOORING CO., 23 Mallory Ave., Jersey City, N. J.

KERLOW open STEEL FLOORING

Make Every Pay Day a Bond Day · Buy U. S. War Bonds and Stamps

KERLOW RETICULATED DESIGN . . . A PATTERN FOR VICTORY

Dependable power for vital airfield construction —— with

LE ROI ENGINES

When your equipment is Le Roi-powered, you know you have extra power for the pinches—dependable power for the long pull—economical power to keep costs down. • Below you see a Barber-Greene bituminous paver laying runways at a Mid-western airfield. Construction men everywhere are depending on Le Roi engines in critical situations today — to help them hold a reputation for coming through on time. Get Le Roi power on *your* next equipment. *Le Roi Company, Milwaukee, Wis.*

E-12

Many leading types and makes of construction equipment are Le Roi-powered

Co. deals with vibrating screens manufactured by the company for handling of liquids.—*Robins Conveying Belt Co., Passaic, N. J.*

Safety—"Safety Digest" published by the American Mutual Liability Insurance Co., consolidates between its covers ten leading articles on accident prevention. These articles are based upon the field experience and research of American Mutual safety engineers. They have felt that industry has found them particularly timely, interesting and helpful. —*American Mutual Liability Insurance Co., 142 Berkeley St., Boston, Mass.*

Paint Safety—Among the many problems created by dim-outs and black-outs, the question of public safety is one of the most important, according to the latest issue of "Paint Progress," a publication of the New Jersey Zinc Co. With street lighting reduced to a minimum, municipal authorities are being forced to consider the painting of street intersections, curbings and various street obstructions with white paint for better visibility. This interesting development in painting provides the subject for a feature article in the issue.—*The New Jersey Zinc Co., 160 Front St., New York, N. Y.*

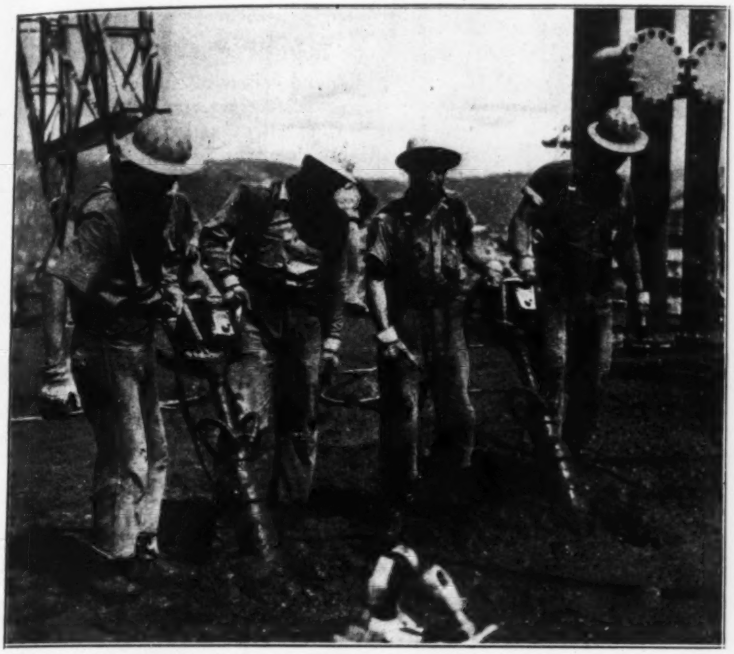
For Victory—In its all out drive for maximum production of war material, labor has shown a constant and growing need for counsel and assistance in the technical problems of production. To meet this need, and to fill the many and varied requests of unions for such assistance, the International Federation of Architects, Engineers, Chemists and Technicians, a C. I. O. organization, has issued a bulletin "Producing for Victory—A Labor Manual for Increasing War Production." The booklet is a compilation of the best practices in modern industrial management and has been written around the experiences and the most pressing problems of war workers and unions in the nation's war industries. *International Federation of Architects, Engineers, Chemists and Technicians, 5 Beekman St., New York, N. Y.*

Fire Engines—Because of the vital importance of adequate fire protection to such essential and hard to replace equipment as diesel engines, the American-LaFrance Foamite Corp. has issued a new release detailing protective methods for such engines.—*American LaFrance Foamite Corp., Elmira, N. Y.*

Press Brakes—A 64 page, well illustrated catalog on press brakes and their uses has just been issued by the Cincinnati Shaper Co. The booklet is largely

★ ★ ★ ★ CHICAGO PNEUMATIC NEWS ★ ★ ★ ★

CP VIBRATORS PLACE 20,600 CU. YDS. IN 24 HOURS



↑ **OVER 1,000,000 CUBIC YARDS OF CONCRETE** were placed in a three month period on this dam. These CP Vibrators performed a major part in achieving this record. They are CP-519 Hicycle Electrics. In this typical topping off operation shown above, notice the dryness and harshness of the mix as indicated by men standing on the fresh concrete.

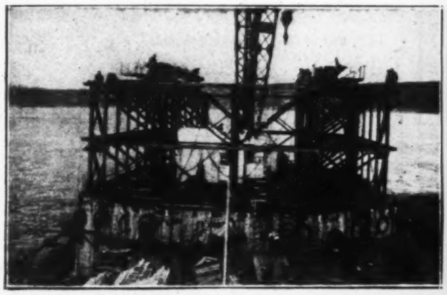
SEVEN 5-MAN CREWS SET WORLD'S RECORD AT LARGE DAM

75 CP Vibrators on One Project

NEW YORK (CP) — During the construction of one large dam seven 5-man crews, working with CP-519 Hicycle Electric Concrete Vibrators, placed 20,600 cubic yards of concrete in a 24-hour day — a record that will probably stand for many years.

In addition to this record-breaking performance, CP Vibrators, Pneumatic and Electric, made outstanding records for performance and low maintenance on more than thirty other dams during the last four years. Write for complete data on the seven models of CP Concrete Vibrators.

CHICAGO PNEUMATIC
TOOL COMPANY
General Offices: 8 E. 44th St., New York, N. Y.



↑ **REPAIR PARTS COST** only $95.00 — that's the maintenance record of CP-219 Pneumatic Vibrators which placed 50,000 cu. yds. of concrete in the caissons for a large bridge.

COMPACTING CONCRETE around penstocks→ at a well-known dam. This vibrator is a CP-325 Pneumatic, for reinforced concrete.

↑ **APPROXIMATELY 1.7 MILLS** per cubic yard was the cost of parts maintenance for four CP-518 Pneumatic Vibrators which placed 312,000 cu. yds. of concrete.

CHICAGO
PNEUMATIC

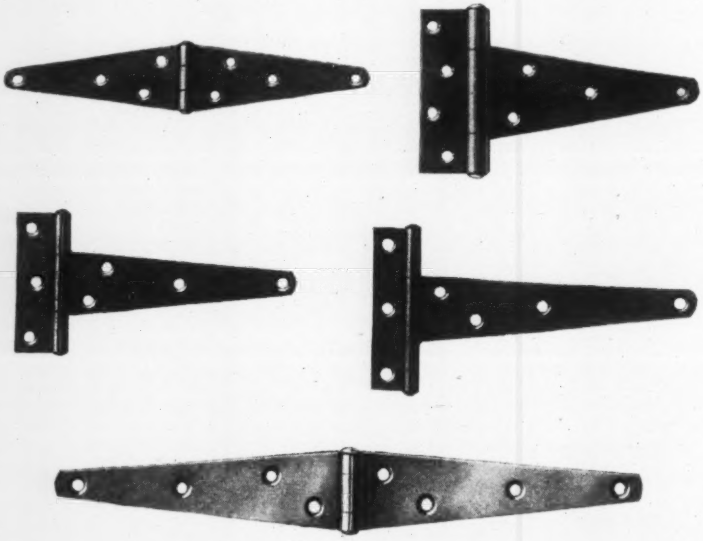
CONTRACTORS' EQUIPMENT

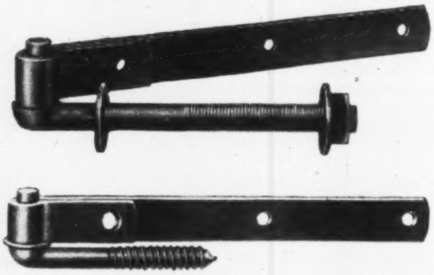
Air Compressors, Rock Drills, Pneumatic Tools, Vibrators, Pumps, Electric Tools, Diesel Engines

Full gauge . . . close-fitting joints . . . accurate countersinking

STANLEY STRAP
and T-HINGES

Stanley Strap and T-Hinges are available in all sizes and weights to swing any door.





Catalog No. 61 describes the full line of Stanley Hardware for every type of building. Write for a copy. The Stanley Works, New Britain, Connecticut.

STANLEY
TRADE MARK
HARDWARE FOR CAREFREE DOORS

PILE HAMMERS
and
EXTRACTORS
HOISTS—DERRICKS
WHIRLERS

Write for descriptive catalogs
McKIERNAN-TERRY CORP.
13 Park Row, New York

EPPINGER AND RUSSELL CO.
Wood Preservers Since 1878
All kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or
DU PONT CZC Chromated Zinc Chloride
80 EIGHTH AVE., NEW YORK, N. Y.
POLES, CROSS ARMS, PILING, TIES
POSTS, BRIDGE AND DOCK TIMBERS
TREATING PLANTS
Jacksonville, Fla. Long Island City, N. Y.

devoted to pictures showing press brake applications, binding and punching load charts, features for special work and pages of dies and their uses.—*The Cincinnati Shaper Co., Cincinnati, Ohio.*

Aluminum—A new booklet "Machining Alcoa Aluminum" has just come off the presses. The booklet sets forth the general principles of machining aluminum and its alloys; suggests speeds, feeds, and depths of cut which will produce satisfactory results; points out where practices and tools common to other metals may be used, and indicates where special practices or tools are desirable.—*The Aluminum Co. of America, Pittsburgh, Pa.*

Tires—Explaining in detail how many extra months of service can be obtained from the tires used on all types of excavating and construction equipment, the Firestone Tire & Rubber Co. has issued a publication called "Firestone Tires in the Construction Field."—*The Firestone News Bureau, Akron, Ohio.*

Nozzles—The Chain Belt Co. has issued a new illustrated folder describing its Rex spray nozzles. The illustrations of this ingenious device in the folder show various uses which range all the way from cooling fruit in packing plants and cleaning trolley buses in garages to washing logs in lumber mills or descaling sheets and plates in steel mills. The nozzle itself is described as a non-clogging device which throws a flat fan-like, hard-hitting spray with such force that it removes dirt and grit from the most irregular surface.—*Chain Belt Co., 1600 West Bruce St., Milwaukee, Wis.*

War Map—A new Esso war map has been in preparation for many months and is now available to the general public. The map involves a projection never before used on a map for general distribution, emphasizing the colossal problems of supply and transportation. The map is new in every detail, prepared especially by the map makers who for many years have produced Esso's accurate and legible road maps.—*Colonial Beacon Oil Co., 26 Broadway, New York, N. Y.*

Koroseal—Koroseal, a plasticized polyvinyl chloride described as a synthetic elastic with many rubber-like qualities, is described in a new booklet "Koroseal Handbook of Technical Information," issued by the B. F. Goodrich Co. Well illustrated, the first section of the handbook tells the nature and chemistry of Koroseal, physical properties, together with mixing and processing procedures. —*The B. F. Goodrich Co., Akron, Ohio.*

Pumpcrete—A new catalog descriptive of the 1942 models of the pump that

CAN *YOU* MOBILIZE EVERY WEEK?

THE plain fact is—we can't win this war without plenty of steel. But if we are to have plenty, all factories, mills, shops, mines and other units of American industry must organize at once to turn in every available pound of scrap metal—and keep on turning it in regularly.

At least six million tons more scrap must be collected than last year!

Where is this "extra" scrap?

Part of it may be on your premises! It is certain that a vast mountain of precious iron and steel lies idle in unsuspected hiding places throughout the country. The usual methods of collection will not release enough to meet present demands. It will take special diligence on the part of every executive in industry to put the 1942 Scrap Drive over the top. To get started with your part in this job, check these three kinds of scrap, and see if you are turning in all three:

"BREAD-AND-BUTTER" SCRAP— The kind most plants sell regularly — filings, shavings, stampings — metal scrap created in the process of manufacture or construction.

DORMANT SCRAP — Unused or abandoned equipment, broken or worn-out machine parts, old boilers, moulds, dies, pipe, valves, electrical equipment, engines, trucks, etc.—the "junk" that accumulates but often misses routine scrap collection.

"RAINY-DAY" SCRAP—The hardest of all to part with. Includes obsolete machinery, unused metal buildings, stacks, outdated tools, fixtures, patterns, stocks, etc.—idle now because they're being saved for possible use in some indefinite future emergency. The emergency is here! This metal should be scrapped, unless it can be reconditioned and put to work now.

★ *Your scrap is worth its weight in Victory!* ★

By organizing a thoroughgoing salvage program now, you'll not only serve your country, but you'll also bring additional income to your business and pave the way for more economical post-war operation through the elimination of waste.

SUGGESTION: *Organize your own scrap drive!*

1. Put some one individual in charge of salvage in all departments of your business, and *give him the authority to act.*
2. Organize a forceful program, with the help of your local Industrial Salvage Committee.
3. Promote the drive to all your employees. Dramatize it with posters and incentive systems. Make every man and woman "scrap conscious."
4. Emphasize *speed* and *continuous* effort. The quicker scrap gets to steel mills, the faster tanks and ships get into action. And it must *keep on coming*, as long as the war lasts.
5. For help or information, contact your local W.P.B. office, or write to the Bureau of Industrial Conservation, War Production Board, Washington, D.C.

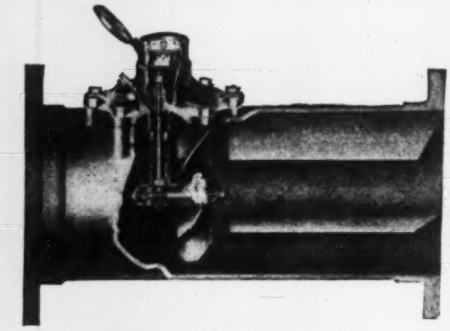
AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
CARNEGIE-ILLINOIS STEEL CORPORATION
Pittsburgh and Chicago
COLUMBIA STEEL COMPANY
San Francisco
NATIONAL TUBE COMPANY
Pittsburgh
TENNESSEE COAL, IRON & RAILROAD COMPANY
Birmingham

USS

UNITED
STATES
STEEL

Meters for Main-Lines

Municipal • Military • Industrial



THE installation of Sparling Main-Line Meters in government establishments confirms the judgment of municipal and industrial waterworks men. These meters are serving U.S.A. not only in the United States but from Iceland to Cuba, from Bermuda to Alaska.

EASILY INSTALLED

A Sparling Meter—flanged, threaded, bell & spigot—is installed as though it were a length of the pipe itself. All that is required is a straight flow through the propeller, with no air pockets in the meter section.

ACCURACY CONSISTENT

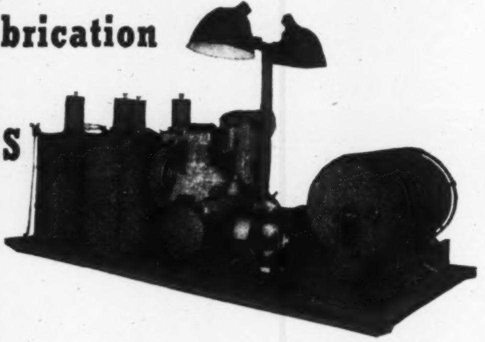
Guaranteed within 2% throughout the rated range, accuracy extends, in the case of Compounds, to ranges of 1 to 120. Head pressure loss is negligible in most cases. All Sparling Meters are complete Totalizing units.

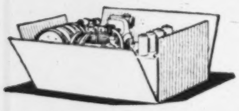
Bulletin No. 308 will be sent upon request

R. W. SPARLING

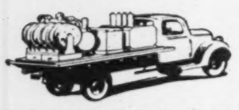
Box 3277 Terminal Annex..LOS ANGELES
3104 Michigan Avenue........CHICAGO
622 Broadway..............CINCINNATI
101 Park Avenue............NEW YORK
6 Beacon Street...................Boston

For Quick, Sure, "On-the-Job" Lubrication Specify GRACO CONVOY LUBERS

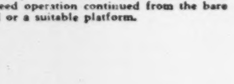




Completely assembled and boxed in one crate, Convoy Lubers can be unpacked, mounted on a truck or trailer, loaded with lubricants, and operating in a matter of minutes.



Mounted on truck or trailer Convoy Lubers bring pressure lubrication to the job, save time and money with complete modern lubrication facilities, with every hand gun, tool, adapter, and accessory at the operator's finger tips.



When truck or trailer is needed for other work, the Convoy Luber can be removed intact and full speed operation continued from the bare ground or a suitable platform.

★ Graco Convoy Lubers, for complete lubrication of construction equipment ON-THE-JOB, include engine-driven air compressor, powerful pneumatic lubricant pumps dispensing from original containers, one 50-ft. air hose and four 30-ft. lubricant hoses mounted on reels, tool box, and complete tool and accessory kit. In addition, some models like that illustrated, include a 110-volt lighting plant and flood lamps for night operation. The complete unit is assembled at the factory on a heavy steel frame and shipped to you ready to operate.

Stop lubrication delays . . . write or wire for prices and details.

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Minneapolis, Minn.

pumps concrete—the Rex Pumpcrete—is now available. The booklet gives technical data concerning how to operate, set up a Pumpcrete system, and also interesting pictures of jobs that Pumpcrete is doing or has already done. It also contains complete specifications and dimensions for all of the various size machines. *—The Chain Belt Co., Milwaukee, Wis.*

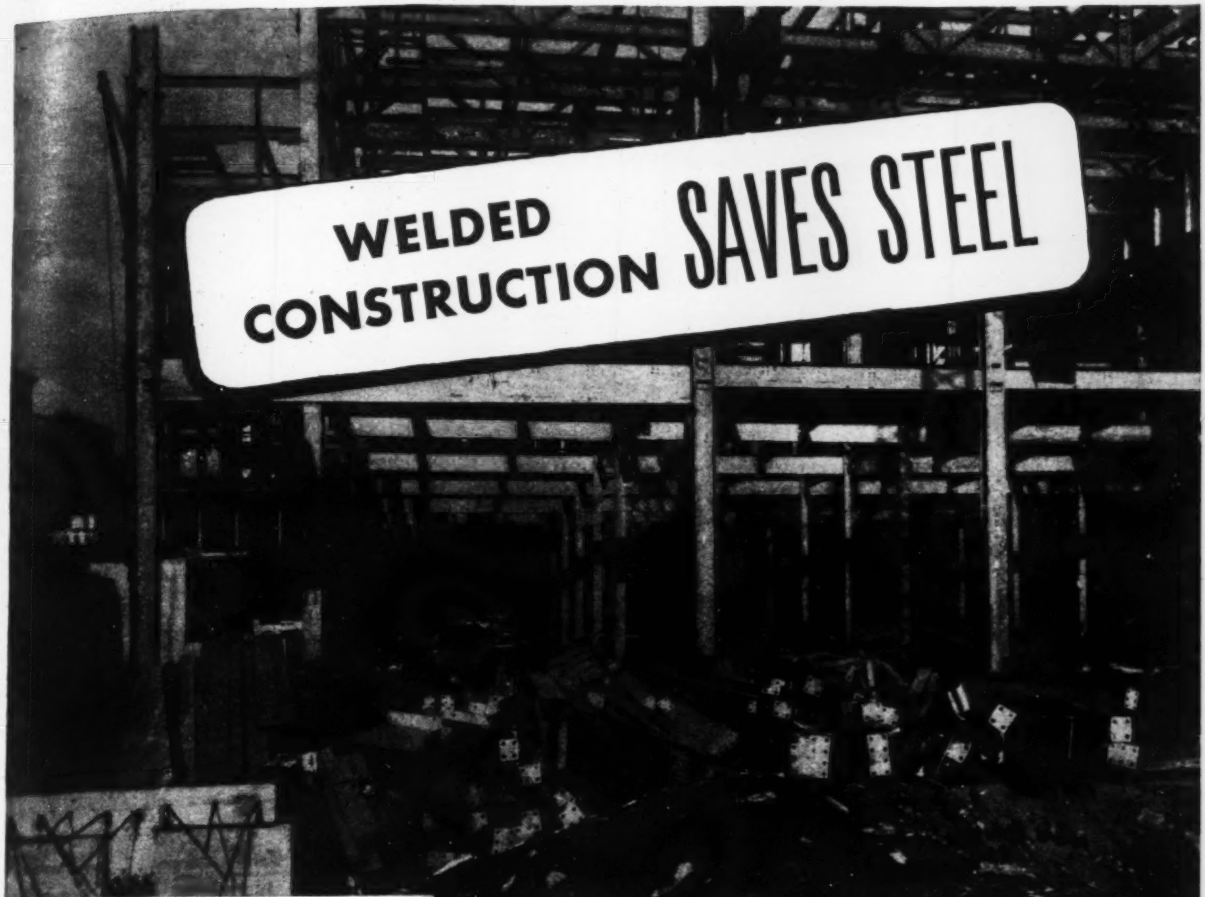
Sewer Compound—Keystone Asphalt Products Co. has issued a new 4-page bulletin on its Kapco sewer compounds. Hot pouring and cold troweling types are discussed in connection with savings accruing to the user by packing in fibre containers rather than conventional steel drums. A convenient table gives quantities of both types needed per joint for pipe sizes from 4 to 36 inches.*—Keystone Asphalt Products Co., 43 E. Ohio St., Chicago, Ill.*

Precision Balances—Two new precision balances for accurate and rapid repeated weighings of small particles ranging from less than 3 mg. to more than 50 grams, are described, illustrated and listed in Catalog 4550, recently issued by the Roller-Smith Co. The publication gives information on the application of the balances, describes how weighings are made, and shows how to select the correct range of balance best suited to the weighing application. A complete listing of the various balances available, their list prices and the attachments that can be furnished also are included.*—The Roller-Smith Co., Bethlehem, Penna.*

Sewage Equipment—An 8-page bulletin, Form 311, describing Graver sewage equipment, is now available from the manufacturer.*—Graver Tank & Mfg. Co., Inc., East Chicago, Ind.*

Rubber Uses—Designed to present maximum information in easily accessible, indexed, condensed form, the B. F. Goodrich Co. has just published a 30-page "Rubber Guide Book for American War Industries," listing the application and properties of many types of products for industrial and aeronautical purposes, using natural, synthetic or reclaimed rubber. Handsomely illustrated, the book is divided into eleven indexed sections, showing the properties of various synthetics and listing principal rubber goods produced.*—The B. F. Goodrich Co., Akron, Ohio.*

Heating—A new catalog of steam generators and necessities has recently been issued by the Vapor Car Heating Co., Inc. In addition to the vapor "Packaged Steam" generator, which is used wherever there is a demand for a steady source of steam or an indicated need for an emergency unit, the catalog includes



WELDED CONSTRUCTION SAVES STEEL

Considerable savings in materials are made possible by welded construction. For instance, because no allowance need be made for punched holes — lighter plates and sections are used. Also, with welded construction it is unnecessary to overlap plates in order to join plate edges . . . less connection material — many times, none at all — is required to join members or plates at their intersections.

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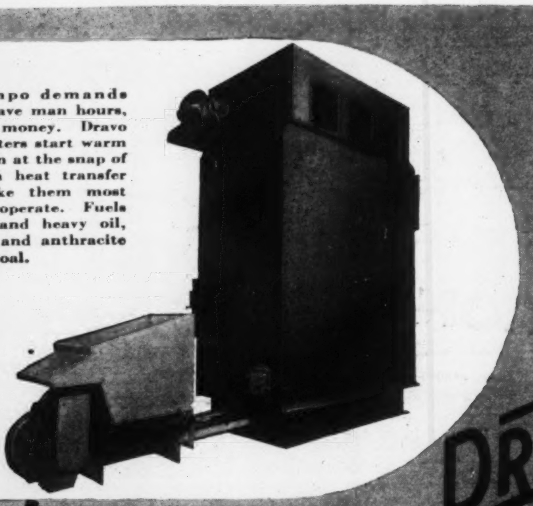

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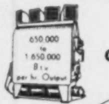
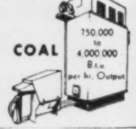

650,000 to 1,650,000 B.t.u. per hr. Output
GAS

COAL
750,000 to 4,000,000 B.t.u. per hr. Output

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several types of valves, traps, metallic joints, thermostatic controls, a motorized valve and damper, heat exchanger, command alarm, and other features. The catalog also includes a spread of typical layouts, showing uses of the generator and necessities. A loose-leaf binder permits new sheets being added as new developments arise.—*The Vapor Car Heating Co., Inc., 80 E. Jackson Blvd., Chicago, Ill.*

Capacitors—"Save Copper—Get More Capacity Quickly" headlines a colorful 6-page folder on Dykanol capacitors for power factor improvement, just issued by Cornell-Dubilier Electric Corp. This bulletin weighs a familiar plant problem—overtaxed electrical systems, insufficient line, transformer and switching equipment capacity—then presents a solution that boosts factory output while saving all-important time, materials and labor.—*Cornell-Dubilier Electric Corp., South Plainfield, N. J.*

Shovels—"How to Get More Work Out of a Shovel," a pocket-size booklet containing practical tips for moving more material with less effort by means of the common hand shovel, is an interesting contribution to the nation's war effort. Believed to be one of the first of its kind dealing with such a commonplace tool as a hand shovel, the booklet, by means of diagrams and simple, straightforward text, shows correct methods of using various types of shovels, to obtain the greatest efficiency and least breakage or damage.—*The Union Fork & Hoe Co., Columbus, Ohio.*

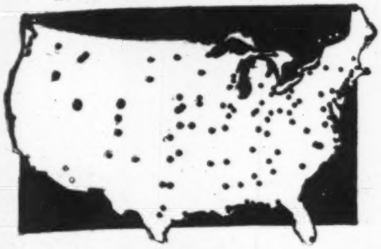
Maintenance — In conveniently arranged form, Clark Bros. Co., Inc., manufacturers of engines and compressors, have published a booklet entitled "Maintenance Hints for Clark 'Angle' Super Two Cycle Gas Engine Driven Compressors." The booklet considers the proper maintenance of the unit and the troubles which operators sometimes encounter and methods of solving such problems.—*Clark Bros. Co., Inc., Olean, N. Y.*

Flowmeters—A new edition of Cochrane's complete flowmeter line totals 56 pages and besides describing electric, mechanical, linameter, ring balance, liquid level and weir meters, the catalog also covers the new two pen electric flow recorder with ratio indicating pointer, an improved low pressure electric type meter, and the ultra high pressure ring balance meter. Well illustrated the catalog also includes a discussion of flow metering benefits and complete listings of specifications and ranges.—*Cochrane Corp., Philadelphia, Penna.*

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York
ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
(Daily service also available—Write for details)

Location of ENR Correspondents



Symbols and Abbreviations Include

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily
A-E-M	Architect — Engineer-Management type of contract.

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges, Grade Cross'gs
Streets & Roads
Earthwork, Waterways
Unclassified
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):
BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

WATER SUPPLY

PROPOSED WORK

†Conn., Groton (br. New London)—Boro, 4,000 ft. 12 in. watermain, pump. sta., equip. $64,900; repairing leakage Groton Boro Dam. $17,750. **FWA.**

Conn., Middletown—P. Wks. Dpt., City Hall, emergency water supply, artesian wells, Mt. Higby Sect. $15,000.

†Florida—U. S. Eng., Courthouse & Postoffice, Jacksonville, water, sewerage sys., imprvs.

†Ind., Charlestown—Town Bd., E. H. Orman, pres., rejected private invitational bids received Aug. 28, 3 mi. watermains. $110,000. **FWA.** Lewis S. Finch, engr., 276 Century Bldg., Indianapolis, instructed to seek negotiated contract. CD 8/4—ENR 8/6.

†Pennsylvania—U. S. Eng., Standard Oil Bldg., Baltimore, Md., water control pit and water separator pit, Dauphin Co., to Herre Bros., 2250 N. 7 St., Harrisburg, under **$50,000.**

†Tex., Garland—C. Olinger, mayor, rejected bids Aug. 14, waterworks imprvs., sewerage sys., exten. **FWA.** H. B. Gieb & Co., Texas State Bank Bldg., Dallas, engrs. CD 8/26—ENR 8/13, under LB.

★ **Tex., Houston**—City, c/o J. C. McVea, dir. Water Dpt., City Hall, waterworks imprvs. $1,925,530. Applied for **FWA funds.** C. L. Fugate, 631 Harvard St., Houston, engr.

Tex., La Porte—City, c/o F. R. Rufe, mayor, waterworks, $65,000. Applied for FWA funds. Ajax Engineering Co., La Porte, engr.

†Washington—U. S. Eng., 810 Third Ave., Seattle, water supply well, to R. S. McClintock, 418 W. Second Ave., Spokane. Est. under **$50,000.**

Wash., Bellingham—Replacing watermains, 3950 ft. 12 in. Happy Valley main, Gates line on 24 St. and Connelly Ave. $35,000. E. W. Gooch, City Hall, engr.

Wash., Seattle—8 and 16 in. watermains in area bounded by Avalon Way, Fauntleroy Ave. and W. Spokane St., also in 35 Ave. S.W. from Avalon Way to W. Morgan St. $84,255. C. L. Wartelle, city engr.

N. S., North Sydney—Ratepayers to vote this fall watermain between North Sydney and Sydney Mines. $60,000.

Ont., Cornwall—Exten. water, sewer facilities etc. to building development, St. Andrews Rd. $30,000.

Que., Ste Croix de Lotbiniere—Municipality, c/o J. E. Michaud, clk., rejected bids July 28, WW imprvs. Ratepayers to vote Sept. 3. $25,000. CD 7/2.

BIDS ASKED

Bids Asked September 14

N. Y., Seneca Falls—Bd. Water Comrs., Village Hall, 136 Fall St., WW intake crib in Cayuga Lake, 1,950 ft. 16 in. c.i. intake pipe, 700 ft. 15 in. concrete drain line. Buck, Seifert & Jost, 112 E. 19 St., New York, N. Y., consult. engrs. CD 3/25/41—ENR 3/27/41.

Bids Asked September 23

Pa., Phila.—Dpt. P. Wks., Bureau Water, City Hall Annex, preliminary treatment plant, Queen Lane Filters (readvertisement), Contr. 126-WWI. Plans deposit $25. J. H. Neeson, dir.; adv. ENR 9/10. CD 3/18—ENR 3/26.

Bids Asked September 28

Pa., Phila.—Dpt. P. Wks., Bureau Water, City Hall Annex, Torresdale Pumping Station, structure and piping, Contr. 133-WWI. Plans deposit $25. J. H. Neeson, dir.; adv. ENR 9/10.

Bids Asked

†Texas—U. S. Eng., Fort Sam Houston, pump. facilities for Well 2, Spec. 42-333. Plans deposit **$25.**

LOW BIDDERS

†Vt., Springfield—Village, Aug. 28, water sys., Vt. 43-103, from M. J. Burrington Jr., 505 Main St., Bennington, **$46,308. FWA.** CD 8/24—ENR 8/20.

†Wash., Annapolis—Federal Works Agency, Alaska Bldg., Seattle, Aug. 28, water dist. sys., from M. Malaspina, 1803 30 Ave. S., Seattle, **$57,978.** Est. $52,000. CD 8/20.

CONTRACTS AWARDED

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, pipe line exten., water service, Riverside Co., to Palm Springs Water Co., Palm Springs, under **$50,000.**

†Florida—U. S. Eng., Courthouse & Customhouse, Mobile, Ala., wells, furnishing, installing 8 electric motors, Franklin Co., to Layne-Central Co., 1993 Chelsea Ave., Memphis, Tenn., **$50,000-$100,000.**

Kan., Topeka—L. B. Smith, water comr., 1 mg. concrete water storage tank, to Jones-Hettelsater Constr. Co., Mutual Bldg., Kansas City, Mo., **$131,800.** Former contract rescinded. Bids 8/25. CD 7/29—ENR 7/31 under CA.

†Mass., East Longmeadow—Federal Works Agency, 99 Chauncy St., Boston, water sys., Mass. 19-168, to W. C. Ferguson, Fitzwilliam Rd., East Jaffrey, N. H., **$20,130.** Bids 8/31. CD 8/25—ENR 8/27.

★ **†Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, watermains, sanitary sewers, septic tank, Wayne Co., to R. L. Coolsaet Constr. Co., 7600 Middlesex Ave., Dearborn, under **$1,000,000.**

★ **†Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, water reservoir, pump. station, Alpena and Iosco Counties, to R. E. Dailey & Co., 4500 Oakman Blvd., Detroit; water supply lines, distr. sys., to McManus & Mickelsen, 3340 Fenkel St., Detroit, ea. contract under **$1,000,000.**

†Missouri—U. S. Eng., P. O. Box 97, Memphis, Tenn., water storage reservoir, pump. plant, Dunklin Co., to Edw. A. Simon, 7526 Wyndwn St., St. Louis, under **$50,000.**

†Pennsylvania — U. S. Eng., Penn Mutual Bldg., Phila., water distr. and sanitary sewer sys., Berks Co., to Counties Contg. & Constr. Co., Inc., 20 and Cambria Sts., Phila., **$100,000-$500,000.**

†Texas—U. S. Eng., Albuquerque, N. M., drilling, casing, water supply wells, to Bill Purcell, Monahans, under **$50,000.**

†Texas—U. S. Eng., Citizens Bank Bldg., Denison, elevated steel storage water supply tank, pump. station, sewage treatment plant, Inv. 257-43-11 to Williams & Whittle and Williams, c/o Broughton, 5422 Mockingbird Lane, Dallas. **$50,000-$100,000** imprvs., to Star Constr. Co., Oklahoma City, **$100,000-$500,000.** Awarded 8/26.

†Texas—U. S. Eng., Citizens Bank Bldg., Denison, water and sanitary sewer lines, etc., to Parrott-Oldt, 403 Haskell St., Dallas, **$50,000-$100,000.**

†Texas—U. S. Eng., Citizens Bank Bldg., Denison, water distr. sys., sanitary sewer collecting lines, natural gas distr. lines, to Skyline Builders, Inc., 522 Ave. J, Dallas, **$50,000-$100,000.** Awarded 8/29.

†Texas—U. S. Eng., San Antonio, water and sewerage sys., Bexar Co., to Fred W. Geyer Plumbing & Heating, 175 Mahhncke St., San Antonio, under **$50,000.**

N. S., Dartmouth—Dominion Govt., Ottawa, Ont., water sys., to Armstrong Constr. Co., Ltd., 19 N. Main St., Brampton, Ont., **$23,000.** Dpt. Air Defense, Ottawa, Ont., engrs.

Ont., Orillra—H. E. M. Payne, municipality clk., exten. water sys., day labor. **$17,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Calif., San Pablo—San Pablo Sanitary Dist., F. Carlfield, secy., Firehouse, bids soon sewers Assessment Dist. 15. Over $25,000. P. Jones, Box 1299, Vallejo, engr.

†Conn., Fairfield—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., sewerage sys., for Knapps Housing. $100,000.

†La., De Ridder—City, sewage treatment plant. $300,000. **FWA.** Anson F. Rideout, De Ridder, engr.

†Okla., Midwest City—St. Bd. Health, sewer facilities, Okla. 34-177F, $80,000. **FWA.** Harry Veltman Becker, 2735 N.W. 17 St., Oklahoma City, engr.

†S. C., North Charleston—Pub. Housing Auth., NHA, North Interior Bldg., Wash., D. C., sewerage sys. $40,000. John McCrady, 9 State St., Charleston, engr.

Tex., La Porte—City, c/o F. R. Rufe, mayor, sewer facilities, $79,000. Applied for FWA funds. Ajax Engineering Co., La Porte, engrs.

†Tex., Victoria—City rescinded contract imprv. sanitary sewerage sys., Docket Tex. 41-271. CD 6/9—ENR 6/11, under CA.

Ont., Belle River—Twp. of Gosfield, Belle River, drainage imprvs. $25,000. C. D. Allison, Belle River, engr.

Ont., Leamington—Mersea Twp., c/o R. E. Imerson, clk., drainage imprvs., $25,000. Newton & Armstrong, Bartlett Bldg., Windsor, engrs. CD 12/29—ENR 1/1.

Ont., Ottawa—Dominion Govt., Ottawa, rejected bids Aug. 18 sewage disposal plant, at Hagersville. Will readvertise. $35,000. Dpt. Munitions & Supply, Ottawa, engrs.

BIDS ASKED

Bids Asked September 16

Me., Bath—City, Sewer Dpt., City Hall, exten. sanitary sewers. $62,500. Plans deposit $10. Whitman & Howard, 89 Broad St., Boston, Mass., engrs. CD 8/4—ENR 8/6.

Bids Asked September 18

Tex., San Antonio—Bexar County Water Control & Imprvt. Dist. 8, c/o C. W. Fenstermaker, pres., Terrell Hills, 5.9 mi. sewerage collecting sys., pump. plant force main and outlet sewer, Terrell Hills, with outlet main at Burr Rd. and Bway. Plans deposit $25. Terrell Bartlett Engineers, 912 Smith Young Tower, engrs. CD 8/26—ENR 9/3.

Bids Asked

★ **†Oklahoma**—U. S. Eng., Box 61, Tulsa, sewage treatment plant, natural gas distr. sys.; water supply, distr. sys.; grading, leveling roads; outdoor electrical distr. sys., facilities; asphalt surfacing streets, roads; sanitary sewer lines. Entire project over **$3,000,000. Plans deposit $25 ea. project.**

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SEWERS, etc. (Continued)

LOW BIDDERS .

†Ala., Phenix City—City, Aug. 25, trunk sewer, sanitary sewer exten., Ala. 1-190, from Carter Constr. Co., Geneva, **$83,468. FWA.** CD 8/19—ENR 8/20.

CONTRACTS AWARDED

†Alabama—U. S. Eng., Gadsden, sewers, to Smith-Pew Constr. Co., 2117 Piedmont Ave. N.E., Atlanta, Ga. Converse & Polk, Gadsden, engrs.

†Arizona—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., sewer, water and gas sys., Units 2 and 3, to J. S. Sundt & L. M. White, P. O. Box 2592, Tucson, less than **$500,000.** Awarded 8/29.

†Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., sanitary sewerage, water distr. sys., Mississippi Co., to Russell J. Reid, 2109 N. 14 St., Birmingham, Ala., under **$50,000.**

†Florida—U. S. Eng., Court House, Jacksonville, drainage sys., Palm Beach Co., to Bail, Horton & Associates, 409 W. Adams St., Jacksonville, under **$50,000.**

†Mass., East Longmeadow—Federal Works Agency, 99 Chauncy St., Boston, sewerage sys., Mass. 19-169, to N. Cibotti, 349 Huntington Ave., Hyde Park, **$43,079.** Est. $50,000. Bids 8/31. CD 8/25—ENR 8/27.

†Montana—U. S. Eng., Administration Bldg., Fort Peck, sewage treatment plant, facilities, Glacier Co., to Glacier Constr. Co., Cut Bank, under **$50,000.**

†Ohio—U. S. Eng., 925 New Federal Bldg., Pittsburgh, Pa., sewage treatment plant, Portage Co., to National Constr. Co., 12202 Superior Ave., Cleveland, under **$50,000.**

†Texas—U. S. Eng., Fort Sam Houston, sanitary sewerage and water distr. sys., to Panhandle-Sira-Dalton, McGregor, **$100,000-$500,000.**

†Texas—U. S. Eng., Fort Sam Houston, storm sewers, Spec. 42-267, to L. A. Turner, Kyle, **$50,000-$100,000.** Awarded 8/26.

†Texas—U. S. Eng., Fort Sam Houston, sanitary sewer lines, facilities, water lines, Spec. 42-303, to Fred W. Geyer, Builders Exchange, San Antonio, under **$50,000.**

†Tex., Baytown—Tri-City Fresh Water Supply Dist. 2, sewerage sys., disposal plant, Tex. 41-287, to Tellespen Constr. Co., 3000 Clay Ave., Houston, **$54,630.** Est. $50,000. Awarded 9/1. CD 7/9.

†Washington—U. S. Eng., Textile Tower, Seattle, sanitary facilities, to N. Mortensen, 1021 Westlake Ave., Seattle, under **$50,000.**

Ont., Straffordville—Bayham Twp., c/o D. Vallee, clk., drainage imprvs., to Leonard Kilmer, Main St., Corinth. Est. **$25,000.** F. A. Bell, County Bldg., St. Thomas, engr.

BRIDGES, GRADE CROSSINGS

PROPOSED WORK

Colo., Denver—G. E. Cranmer, mgr. Parks & Imprvts., 2 bridges over Platte River, one at West Mississippi Ave., other at W. Evans Ave. A. K. Vickery, city engr.

†B. C., Fort St. John—U. S. Public Roads Admin., 515 14 St. N.W., Wash., D. C., concrete, steel bridge over Peace River. J. S. Bright, Qu' Appelle Bldg., Edmonton, Atla., engr.

LOW BIDDERS

Indiana — State Hy. Comn., Indianapolis, Sept. 1, 2 rein.-con. girder bridges, Davies and Greene Counties, from Ryan & Ryan, Inc., 12 S.W. 1• St., Washington, **$67,386,** est. $76,090; rein.-con. arch bridge, Henry Co., from Wilbur C. Scheirer, 509 W. Barner St., Frankfort, **$45,932,** est. $53,096. CD 8/24—ENR 8/27.

CONTRACTS AWARDED

Washington—State Hy. Dpt., Olympia, 2 bridges, Thurston Co., to Goetz & Brennan, Seaboard Bldg., Seattle, **$87,590.** Bids 9/1. CD 8/17—ENR 8/20.

Quebec—Dpt. P. Wks., Quebec City, to Clovis Beaudet, 77 Blvd. Charest, Quebec City, bridges near Ste Anne du Sault **$25,000,** St. Leonard d' Astou **$67,000,** at Val Alamni **$23,000.** Grand total $115,000.

Quebec—Province of Quebec, Quebec, bridge over Becancour River, St. Louis de Blandford, to Langelier & Thibouteau, Notre Dame St., St. Victor de Beauce, est. **$35,000;** bridge over Nicolet River, Notre Dame du Bon Conseil, Drummond Co., to J. D. Cormier, 175 Radisson St., Three Rivers, est. **$30,000.** O. Desjardines, Dpt. P. Wks., Quebec City, engr.

Que., La Tuque—5 span 375 ft., rein.-con. bridge over Bostonnais River, to O. Boisvert, 60 5 St., Shawinigan Falls. O. Desjardins, Dpt. P. Wks., Quebec City, engr.

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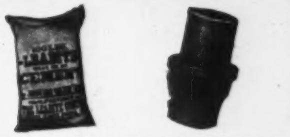

TABLE OF COMPARATIVE QUANTITIES

Nominal inside dia. of pipe, in.	Depth of joint, Inches of Leadite	Approx. lbs. of Leadite per joint	Depth of joint, Inches of lead	Approx. lbs. of lead per joint
4	2.5	2.00	2.25	8.56
6	2.5	3.00	2.25	11.71
8	2.5	4.00	2.25	14.63
10	2.5	5.00	2.25	17.70
12	2.5	6.00	2.25	20.86
14	2.5	7.00	2.25	24.02
16	2.5	8.25	2.25	33.07
18	2.5	9.25	2.25	36.88
20	2.5	10.50	2.25	40.71
24	2.5	13.00	2.50	53.02
30	2.75	16.00	2.50	65.36
36	2.75	19.00	2.50	77.96
48	3.50	30.00	3.00	121.15
54	4.0	38.00	3.00	135.60
60	4.0	42.00	3.00	150.70

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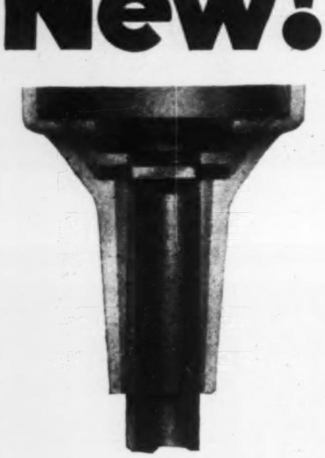

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STREETS AND ROADS

BIDS ASKED

Bids Asked September 14

N. Y., New York — Superintendent School Buildings, Design & Constr., 49 Flatbush Ave., Brooklyn, paving, planting portion site of Machine and Metal Trades High School, E. 96 and E. 97 Sts.

Bids Asked September 15

Indiana — State Hy. Comn., Indianapolis, bituminous widening 4 mi. La Porte Co. CD 8/28—ENR 9/3, under LB.

Bids Asked September 15

★**Ohio**—State Hy. Dpt., Columbus, asphaltic concrete resurfacing 6.961 mi. Sects. A, B, E, F and Springfield of S.H. 1, U.S. 40, Clark Co., $63,970; 4.499 mi. Sects. E-1 and D of S.H. 10, U.S. 22, Fairfield Co., $10,100; delivering and hacking brick 0.593 mi. Sect. Columbus of S.H. 50, Franklin Co., $10,400; widening, leveling with tar concrete, rock asphalt surface course resurfacing 3.666 mi. Sects. F and Yellow Springs of S.H. 195, U.S. 68 and on Sect. Xenia of S.H. 29, U.S. 35, Greene Co., $70,730; grading, draining, widening, asphaltic concrete resurfacing, continuous concrete substructure over Ice Creek and roadside imprvt. on 0.183 mi. Sects. Coal Grove and Ironton of S.H. 7, U.S. 52, Lawrence Co., $115,000; grading, concrete beam bridge, concrete substructure over West Branch Black River, continuous concrete beam bridge, concrete substructure over Charlemont Creek on 1.079 mi. Sects. E and F of S.H. 291, Lorain Co., $200,000; grading, drainage structures, concrete paving 0.984 mi. Sect. Washingtonville of S.H. 86, Mahoning and Columbiana Counties, $71,400; grading, draining, concrete paving, roadside imprv. 0.174 mi. Sect. Beverly of S.H. 393, Washington Co., $18,180; bituminous treating 28.62 mi. various sections S.H. 71, 872, 325 and 919, Mahoning, Stark, Summit and Trumbull Counties, $59,479.

Pa., Pittsburgh—Comrs. Allegheny Co., widening and relocating Clifton and Bridgeville Rd., incl. elimination Bridge 1, replacing with pipe culvert. Levi Burd Duff, County Office Bldg., engr.

Bids Asked September 23

California—State Div. Hys., Sacramento, grading, concrete and asphaltic concrete paving, removing timber bridge 0.5 mi. Napa Co., over $25,000; concrete paving 0.8 mi. between San Francisco-Oakland Bay Bridge and Toll Plaza, Alameda Co., over $25,000. C. H. Purcell, Sacramento, engr.

Bids Asked September 24

California—State Div. Hys., State Bldg., Los Angeles, plant mix surfacing 0.9 mi. Stewart St., Exposition Blvd. and Dorchester Ave., in city of Santa Monica, Los Angeles Co., over $25,000; grading, plant mix surfacing 1.3 mi. Katella Ave. and Deni St. between Los Alamitos Blvd. and Farnquhart Ave., Orange Co., over $25,000. C. H. Purcell, Pub. Wks. Bldg., Sacramento, engr.

Bids Asked

Kansas—State Hy. Dpt., Columbus, rejected bids June 2 grading, concrete paving 0.396 mi. DAWI-9, Cherokee Co., R. C. Keeling, Topeka, engr.

LOW BIDDERS

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, Aug. 28, streets, parking areas, etc., from Arthur Malcolm & V. S. Price, 10820 Collins St., N. Hollywood, under **$500,000.**

Calif., Stockton—City, Aug. 31, imprv. portions County Club, North Country Club and South Country Club Blvds., Pershing, Elmwood and Manchester Aves., Orange, San Jose, Yosemite and Stockton Sts., from Stockton Constr. Co., 40 W. Clay St., **$27,652.**

★**Georgia**—State Hy. Dpt., Atlanta, Aug. 28, imprv. 0.808 mi. Bryan and Effingham Counties, from H. G. Smith, Fitzgerald, **$439,787*****6.38 mi. Colquitt Co., from L. T. Barber, Moultrie, **$219,634*****6.151 mi. Talbot and Harris Counties, from R. H. Wright & Son, 1st Natl. Bank Bldg., Columbus, **$171,315*****1.474 mi. Monroe Co., from Interstate Contg. Co., Savannah, **$120,000*****9.277 mi. Gilmer Co., from Espy Paving & Constr. Co., 108 E. Bay St., Savannah, and C. M. Lyle, Gainesville, **$116,521*****0.899 mi. Wilcox Co., from Crummey & Crummey, Rochelle, **$56,814*****1.236 mi. Schley and Webster Counties, from C. H. Wheatley, Americus, **$41,347.** CD 8/25.

Ill., Chicago—Dpt. P. Wks., Aug. 25, concrete paving W. Cermak Rd. from S. Ashland Ave. to S. Morgan St., from Leininger Constr. Co., 30 N. LaSalle St., **$100,405.** CD 8/18—ENR 8/20.

★**Indiana**—State Hy. Comn., Indianapolis, Sept. 1, imprv. 1.933 Lake Co., from J. C. O'Connor & Sons, Inc., 2104 Miner St., Fort Wayne, **$161,230*****1.23 mi. Vanderburgh Co., from Pioneer Contg. Co., Upper Mt. Vernon Rd., Evansville, **$82,324** est. $91,606***5.971 mi. Hancock and Henry Counties, from Roger Daoust, Defiance, O., **$440,696**, est. $495,373*** 6.069 mi. Porter Co., from Bontrager Constr.

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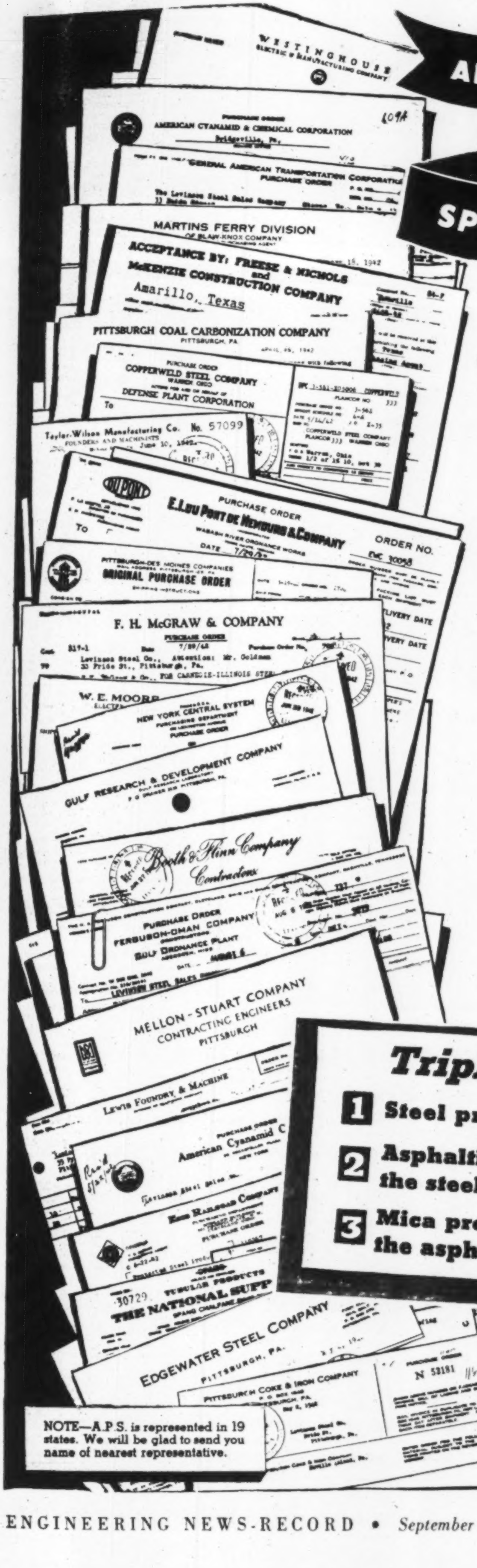
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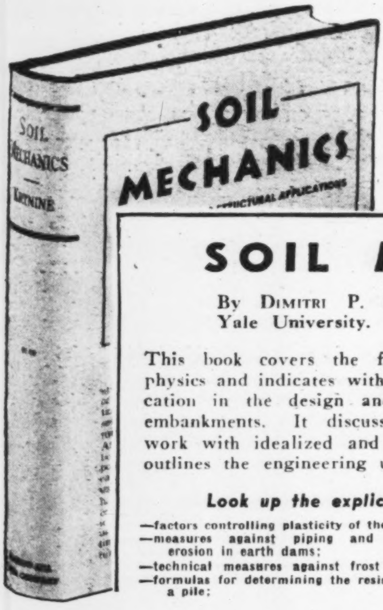

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STREETS, etc. (Low Bidders, Cont'd

Co., 618 W. Indiana St., Elkhart, $4[illegible], est. $550,065***5.841 mi. Pulaski Co., [illegible] Shend & Brown, Milford, **$177,961**, est. [illegible],369. Received no bids imprv. 1.011 mi. M[illegible] Co. and 5.528 mi. Allen Co., will readvertise. CD 8/18 and 8/27—ENR 8/20.

★ **New Jersey**—S. Miller, Jr., Comr. State Hy. Comn., Trenton, Aug. 31, imprv. [illegible] Camden Co., from Robt. W. Cleveland, Box 226, East Orange, **$143,000;** road Burlington Co., from J. P. Burns, Dumont, **$901,732.** CD 8/18 and 8/20—ENR 8/20 and 8/27.

★ **New York**—A. W. Brandt, supt. Pub. Wks., Albany, Sept. 2, imprv. 0.62 mi. Cattaraugus and Chautauqua Counties, from Holmes & Murphy, Orchard Park, $1[illegible],162***3.99 mi. Jefferson Co., from B[illegible] Co., Proctor Bldg., Troy, **$349,503*****2.42 mi. Orange Co., from Seaboard Constr. Corp., [illegible] Kisco Ave., Mt. Kisco, **$198,828*****1.55 mi. Suffolk Co., from Hendrickson Bros. Co., Inc., 53 N. Central Ave., Valley Stream, 7 in. $429,564, 8 in. **$448,523.** CD 8/17—ENR 8/20.

O., Canton—Brick on concrete repaving Navarre Rd. S.W., from General Asphalt & Paving Co. and H. Wise, Kahler Bldg., **$122,852.** Est. $118,660. J. A. Shisler, City Hall, engr.

Oregon—State Hy. Comn., Portland, Aug. 27, flight strips at Alkali Lake in Lake Co. and at Rome, Malheur Co., from C. A. Dunn, Klamath Falls, **$204,645** and **$201,645** respectively. No bids received for 6 stockpiling contracts. CD 8/17—ENR 8/20.

Washington—B. Bantz, dir. Hys., Olympia, Sept. 1, imprv. 5.9 mi. Spokane Co., from C. A. Power, E27 8 St., **$337,099.** CD 8/2[illegible].

Wash., Tacoma—City, Aug. 31, widening E. 11 St., from Woodworth & Co., 1200 E. D St., **$37,763.**

CONTRACTS AWARDED

†Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., gravel roads, walks, drainage, Lawrence Co., to J. M. Cartwright, Aberdeen, Miss., **$100,000-$500,000.**

†Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., roads, walks, parking areas, Mississippi Co., to Forcum James Co., Dyersburg, Tenn., under **$50,000.**

†Florida—U. S. Eng., Courthouse & Postoffice, Jacksonville, roads, Levy Co., to Marion Contg. Co., Ocala, under **$50,000.**

†Florida—U. S. Eng., Courthouse and Postoffice, Jacksonville, roads, Hillsborough Co., to Cone Bros. Contg. Co., Caesar Ave. and Cumberland St., Tampa, under **$50,000.**

†Florida—U. S. Eng., Court House, Jacksonville, roads, Dixie Co., to J. H. Craggs Constr. Co., Ocala, under **$50,000.**

Ill., Chicago—Cook Co., to Frenzel Bros., 3015 N. California Ave., surfacing Wise Rd. **$57,386;** Merge Rd. **$62,373;** Lehigh St., **$40,440*****to Milburn Bros., Mt. Prospect, Mt. Prospect Rd. **$31,786*****to Standard Paving Co., 30 N. La Salle St., Hintz Rd. **$91,198;** Techny Rd., **$25,436*****to Peter J. Crowley Co., Maywood, Alonquin Rd. **$57,700***** to Robert A. Black, 430 W. Erie St., Foster Ave. **$25,430*****to Chicago Heights Constr. Co., Chicago Heights, 127 St. **$35,012*****to Chatham Paving Co., 7050 S. Wabash St., Bell Rd., **$50,760.** Grand total $477,521.

†Maine—U. S. Eng., Park Square Bldg., Boston, Mass., mountain road, Inv. 175-43-Neg. 53, to W. H. Hinman, 62 Pickett St., Portland. Est. **$25,000.** Bids 8/28.

★ **†Michigan**—U. S. Eng., 520 Merchandise Mart, Chicago, Ill., concrete parking aprons, Calhoun Co., to Launder & Son, Inc., Glendle St., Toledo, **O.**, **$500,000-$1,000,000.**

†Michigan—U. S. Eng., 700 Union Guardian Bldg., Detroit, roads, service drives, walks, Wayne Co., to Board of Wayne Co. Commissioners, County Bldg., under **$50,000.**

★ **New Jersey**—S. Miller, Jr., comr. State Hy. Dpt., Trenton, imprv. 3.515 mi. Burlington Co., to Franklin Constr. Co., 20 Washington Pl., Newark, **$708,758.** Bids 7/27, awarded 8/4. CD 7/29—ENR 8/6, under LB.

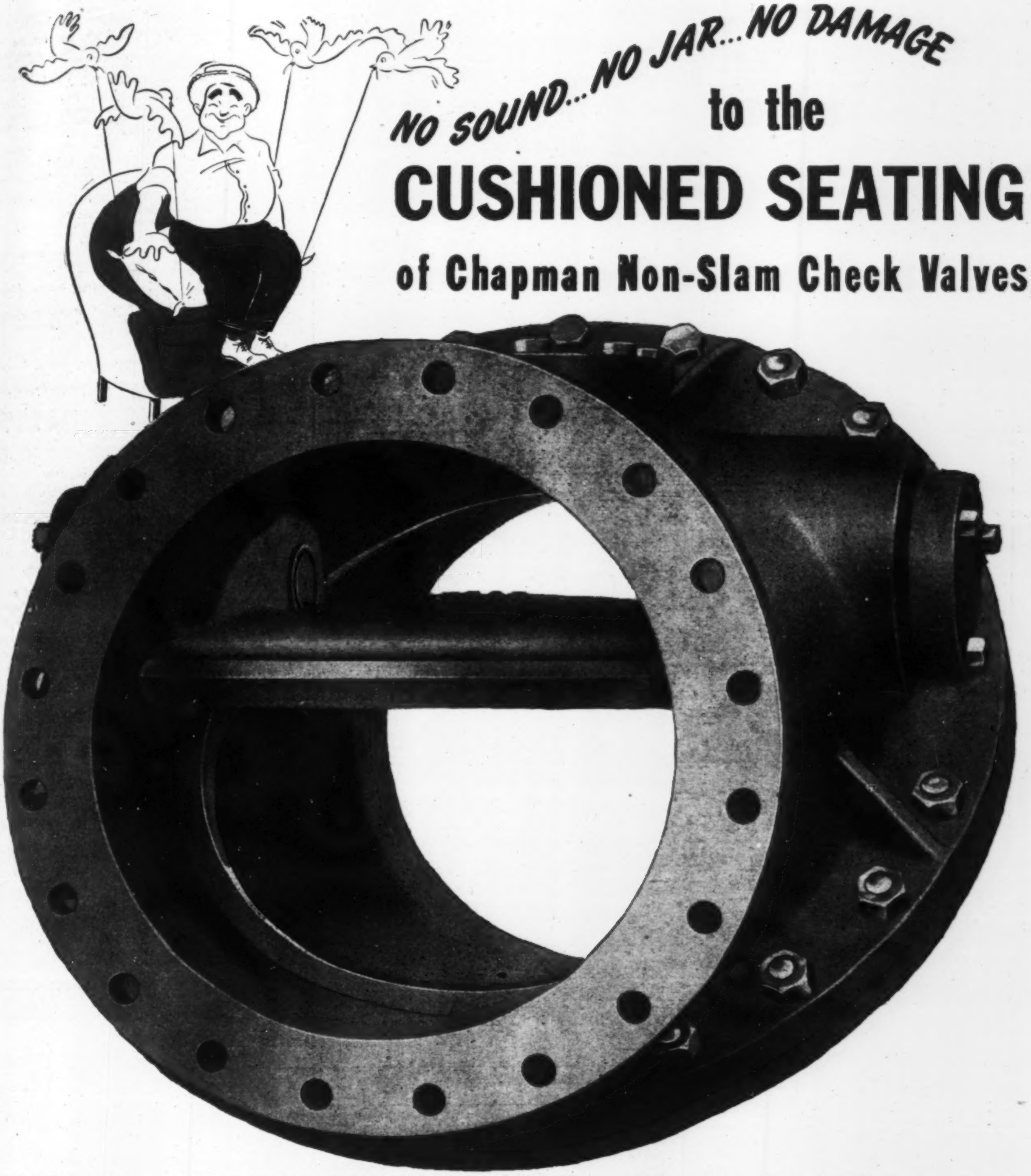
★ **New Jersey**—S. Miller, Jr., state hy. comr., Trenton, imprv. 2.2 mi. Burlington Co., to Union Building & Constr. Co., 631 Main Ave., Passaic, **$694,866.** Bids 8/3, awarded 8/10. CD 8/5—ENR 8/13.

†New Jersey—U. S. Eng., Penn Mutual Bldg., Phila., Pa., grading, paving, topsoiling, seeding, Cumberland Co., to Hill & Fox, Bridgeton, **$50,000-$100,000.**

†New Jersey—U. S. Eng., Penn Mutual Bldg., Phila., Pa., addnl. water supply facilities, Salem Co., to E. J. Howell, Stacy Trent Hotel, Trenton, under **$50,000.**

Ohio—State Hy. Dpt., Columbus, Imprv. 5.099 mi. Columbiana Co., to Kelley & Meyer Co., 522 Dollar Bank Bldg., Youngstown, **$52,575,** est. $54,100***1.813 mi. Columbiana Co., to George B. and Cletus H. Patterson, 1204 Main St., Wellsville, **$167,897,** est. $168,400***2.093 mi. Franklin Co., to Robert J. Dienst, 297 S. High St., Columbus, **$78,501.** est. **$78,950*****5.639 mi. Medina Co., to Ohio Road Improvement Co., Chamber of Commerce Bldg., Columbus, **$26,941,** est. $30,530. Grand total $325,914. Bids 8/25. CD 8/20.

★ **†Oregon**—U. S. Eng., Pittock Blk., Portland, earth moving, paving, to Babler Bros., 1636 S. E. Sixth St., Portland, **$1,000,000-$5,000,000.**



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STREETS, etc. (Contracts Awarded, Cont'd.)

Oregon—State Hy. Dpt., Pub. S[illegible] Bldg., Portland, crushed gravel in sto[illegible] Oregon Trail and Central Ore[illegible] heur Co., to C. T. Lackey, On[illegible] Bids 8/27. CD 8/17—ENR 8/2[illegible] $25,000.

†Pennsylvania—U. S. Eng., [illegible] Bldg., Syracuse, N. Y., clearing, Lu[illegible] Co., to D. W. Oplinger, t/a Oplinger [illegible] Co., Nanticoke, under **$50,000.**

†Pennsylvania—U. S. Eng., [illegible] Mutual Bldg., Phila., roadways, coal [illegible] area, Chester Co., to Dalton Bros., [illegible] Paoli, under **$50,000.**

†South Carolina—U. S. Eng., [illegible] Customhouse, Charleston, clearing, grub[illegible] Richland Co., to Boyle Constr. Co., S[illegible], under **$50,000.**

†South Carolina—U. S. Eng., Postoffice Bldg., Savannah, Ga., clearing, grubbing, grading, draining, Barnwell Co., [illegible] M. R. Thomason, 316 Woodward Ave., Montgomery, Ala., **$100,000-$500,000.**

†Texas—U. S. Eng., Fort Sam Houston, roads and sidewalks, to W. G. Drummond Constr. Co., View, **$50,000-$100,000.**

†Texas—U. S. Eng., Fort Sam Houston, access road, clearing, grading, Spec. 42-293, to Southern States Const. Co., San Jacinto Natl. Life Bldg., Houston, **$50,000-$100,000.** Bids 8/18. CD 8/13.

Utah—State Road Comn., Salt Lake City, resurfacing Hy. 50 between Moark and Mill Fork, Utah Co., own forces. **$30,000.**

†Utah—U. S. Eng., 32 Exchange Pl., Salt Lake City, surfacing, Tooele Co., to V. W. Lawrence, Grantsville, under **$50,000.**

★ **Virginia**—U. S. Eng., 415 Postoffice and Courthouse, Norfolk, concrete roads, gravel shoulders, Warwick Co., to Atlantic Bitulithic Co., Munsey Bldg., Wash., D. C., **$500,000-$1,000,000.**

†Washington—U. S. Eng., 810 Third Ave., Seattle, paving, to J. H. Collins, Walla Walla, **$100,000-$500,000.**

Washington—State Hy. Dpt., Olympia, imprv. 2.68 mi. and 1.5 mi. Spokane Co., to Carbon Bros., N3430 Cook St., Spokane, **$51,016.** Bids 9/1. CD 8/28.

†Wisconsin—U. S. Eng., 408 Federal Bldg., Milwaukee, roads, DA-W-1095-178, to Jutton-Kelly Co., 828 W. Bway., Milwaukee. Bids 8/16.

†United States-Latin America—U. S. Eng., 751 S. Figueroa St., Calif., highway, to Lindgren & Swinerton, Inc., 225 Bush St., San Francisco, Calif., Tucker McClure, by Chas J. Hoffman, trustee, San Francisco, Calif., and A. S. Vinnell, Alhambra, Calif., **$50,000-$100,000.**

Ont., Orillia—Dpt. Natl. Defense, Ottawa, paving at Basic Training Centre, to Brennan Paving Co., Ltd., 400 Gage St. N, Hamilton, **$25,000.**

Quebec—Provincial Dpt. Roads, Quebec City, bituminous concrete paving 9.5 mi. Hy. 8 between Grenville and Point au Chene, to H. J. O'Connell, Ltd., Canada Cement Bldg., Montreal, about **$127,000.** E. Gohier, c/o owner, engr.

Quebec—Dpt. Roads, Quebec City, grading, graveling 8.35 mi. Sir Wilfred Laurier Hy. in Villeroy, Lothiniere Co., to Napoleon Trudelfet Fils, Ste. Irene, **$75,000;** 8.33 mi. Sir Wilfred Laurier Hy. at St. Nicholas South, Levis Co., to Fabi et Fils, Registered, Brewster St., Sherbrooke, **$56,600.** Bids 8/22.

EARTHWORK, WATERWAYS

PROPOSED WORK

†Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., enlarging 12 mi. White River backwater levee, constructing 12 mi. new levee; enlarging, constructing new levees on St. Francis River, and an off-Mississippi River Levee, totaling 26 mi. levee work; enlarging 18 mi. levees in Lower St. Francis Levee Dist.

†Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., 5,980 ft. levee, 1,010,000 cu. yd. earthwork, near Hardin; 1,092,000 cu. yd. levee enlargement from Clear Lake to Luxora.

California—Pacific Gas & Electric Co., 245 Market St., San Francisco, repairing Chute Dam on South Fork American River, El Dorado Co. $22,500.

†Illinois—U. S. Eng., P. O. Box 97, Memphis, Tenn., new levee setback in Cairo Drainage Dist., Ohio River front levee, about 1.25 mi. long.

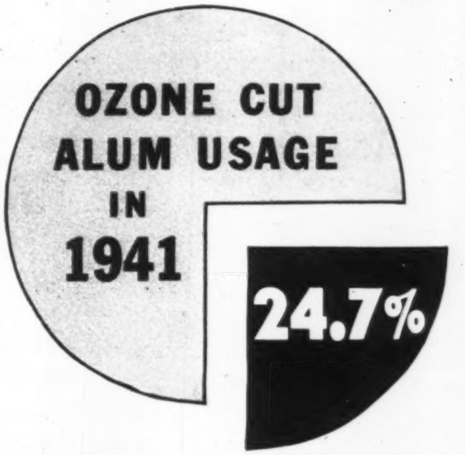
Louisiana—Superior Oil Co., Oil & Gas Bldg., Houston, Tex., dredging to provide depth 6 ft. below mean Gulf level over bottom width 94 ft., Terrebonne Parish. Applied to War Dpt. for permit.

†Missouri—U. S. Eng., P. O. Box 97, Memphis, Tenn., enlarging 21 mi. levees, Upper St. Francis Levee Dist., downstream from Commerce; 34.5 mi. Birds Point-New Madrid Floodway Levee.

Newfoundland, St. Johns—WHARF—Newfoundland Govt., St. Johns, wharf. $30,000 voted. Dpt. P. Wks., St. Johns, engrs.

Ozone

IMPROVES FLOCCULATION AT WHITING, INDIANA



This result is a matter of record at Whiting, Indiana, where the first major modern ozonation water purification plant in the United States was put into operation July, 1940.

It is noteworthy that during this same period, operators of other plants along the southern shore of Lake Michigan, using the same general source of supply, reported increased dosages of alum were needed to produce satisfactory flocculation.

By applying ozone to the incoming raw water, the organic matter (which inhibits flocculation) is oxidized, making satisfactory flocculation possible with a reduced alum dosage.

It is chemical savings like these that make the net operating cost for ozonation only $1.41 per m.g. at Whiting.

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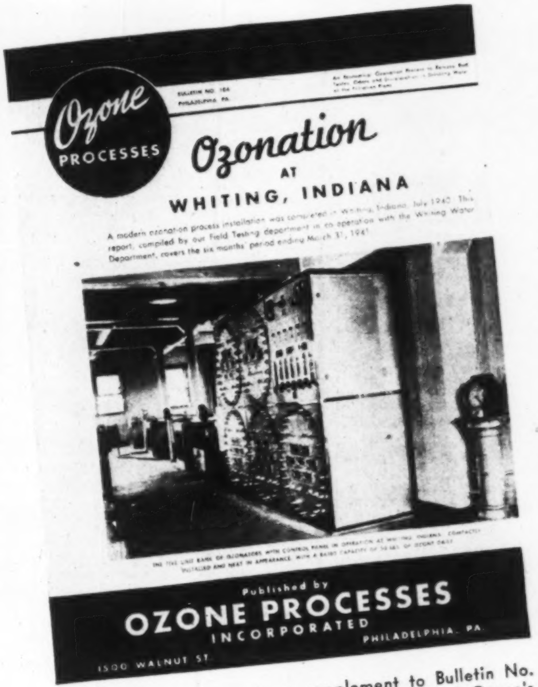

Ozone PROCESSES

BULLETIN NO. 104
PHILADELPHIA, PA.

Ozonation
AT
WHITING, INDIANA

A modern ozonation process installation was completed in Whiting, Indiana, July 1940. This report, compiled by our Field Testing department in co-operation with the Whiting Water Department, covers the six months' period ending March 31, 1941.

Published by
OZONE PROCESSES
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Send for your copy of our supplement to Bulletin No. 104, which tells the up-to-the-minute story of Ozone's success at Whiting.

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EARTHWORK, etc. (Cont'd.)

LOW BIDDERS

†California—Bureau Reclamation, Customhouse, Denver, Colo., Aug. 28, 4 gate frames for spillway, regulating gates, Keswick Dam, Kennett Division, Spec. 1663-D, from American Bridge Co., 1st Natl. Bank Bldg., Denver, Colo., **$68,081.** CD 8/17—ENR 8/20.

†Texas—U. S. Eng., Fort Sam Houston, Aug. 18, concrete pipe, catch basins, manholes, etc., Spec. 42-300, from Riesing Constr. Co., Edinburg, **$50,000-$100,000.** CD 8/13.

Wash., Tacoma—City of Tacoma, Aug. 31, clearing, grading, grubbing, bridges, relocation 6.5 mi. Tacoma-Eastern R.R. at La Grande, part of second Nisqually power development, from Strong & MacDonald, 1011 E. F St., **$348,903.** CD 8/26.

CONTRACTS AWARDED

†Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., levee construction, Lee Co., to Forcum James Co., Dyersburg, Tenn., **$100,000-$500,000.**

†Arkansas—U. S. Eng., P. O. Box 97, Memphis, Tenn., drainage ditch excav., Cross Co., to Atlas Constr. Co., Waxahachie, Tex., **$100,000-$500,000.**

†California—U. S. Eng., 74 New Montgomery St., San Francisco, addnl. drainage facilities, to Peter Sorensen, 927 Arguello St., Redwood City. Awarded 8/31.

†California—U. S. Eng., 75 New Montgomery St., San Francisco, addnl. drainage facilities, to Campbell Constr. Co., 800 R St., Sacramento; D. W. Nicholson Corp., 1701 San Leandro Blvd., San Leandro; and J. J. Moore Co., 354 Hobart St., Oakland. Awarded 8/31.

†Connecticut—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., dredging, to Morris & Cummings Dredging Co., 44 Whitehall St., New York, N. Y., **$100,000-$500,000.** Bids 8/31. CD 8/21—ENR 8/27.

†Illinois—U. S. Eng., Courthouse & Customhouse, St. Louis, Mo., bank protection, Jackson Co., to Patton-Tully Transportation Co., St. Louis, Mo., **$100,000-$500,000.**

†Illinois—U. S. Eng., Courthouse & Customhouse, St. Louis, Mo., piling dikes, Union Co., to Massman-Peterman Co., 1205 Olive St., St. Louis, Mo., **$50,000-$100,000.**

†Mississippi—U. S. Eng., Postoffice & Courthouse, Vicksburg, excavation, Leflore Co., to McWilliams Dredging Co., Hibernia Bldg., New Orleans, La., **$100,000-$500,000.**

†Oregon—U. S. Eng., Pittock Blk., Portland, revetment, Multnomah and Columbia Counties, to C. J. Eldon, 3651 N.E. Wasco St., Portland, under **$50,000.**

†Tennessee—U. S. Eng., P. O. Box 97, Memphis, levee, Phillips Co., to Driver Contg. Co., Cotton Exch. Bldg., Memphis, **$100,000-$500,000.**

†West Virginia—U. S. Eng., Chesapeake & Ohio Bldg., Huntington, dredging, Tyler Co., to Dravo Corp., Neville Island, Pittsburgh, Pa., **$50,000-$100,000.**

†Wyoming—U. S. Eng., 1709 Jackson St., Omaha, Neb., soil stabilization, Laramie Co., to Kroh Bros., Nurseries, Cheyenne, under **$50,000.**

Sask., Herbert—Dominion Govt., Ottawa, Ont., drainage canal, concrete dam, to Manczasz & Rolleck, 14 Main St., Prince Rupert, **$27,000.** Prairie Rehabilitation Bd., 910 McCallum Hill Bldg., Regina, engrs.

UNCLASSIFIED

PROPOSED WORK

★ **North Carolina** and **Virginia**—OIL PIPELINE—Plantation Pipe Line Co., Blount Rd., Baton Rouge, La., 165 mi. oil pipeline between Greensboro, N. C. and Richmond, Va. $3,000,000.

N. D., Wahpeton—AIRPORT—H. T. Hintgen, city aud., airport. $50,000. Will apply to CAA.

†Tennessee—IMPROVEMENTS—U. S. Eng., 306 Courthouse Nashville, preliminary surveys imprvs.

†Tennessee—TRANSMISSION LINE, etc.—Memphis Light Gas & Water Div., 179 Madison Ave., Memphis, 5 mi. wood pole transmission lines, substation, 4 mi. feeder lines. $185,170. **FWA.**

†Texas—IMPROVEMENTS—U. S. Eng., Citizens Bank Bldg., Denison, imprvs.

†Texas — IMPROVEMENTS — U. S. Eng., Federal Bldg., Galveston, rescinded contract imprvs., asphalt paving, Spec. 259-42-685. CD 7/17—ENR 7/23, under CA.

†Washington—OIL SYSTEM—U. S. Eng., 810 Third Ave., Seattle, plans by G. W. Stoddard, Orpheum Bldg., Seattle, lubricating oil sys. Griffin & Lowe, Lloyd Bldg., engrs.

†Wash., Spokane—HANGAR—School Dist. 81, 503-4 St., hangar at Felts Field, $200,000. **FWA.** G. M. Rasque, Washington Trust Bldg., archt.

†Pacific Northwest—GASOLINE FACILITIES—U. S. Eng., Textile Tower, Seattle, Wash., gasoline dispensing facilities.

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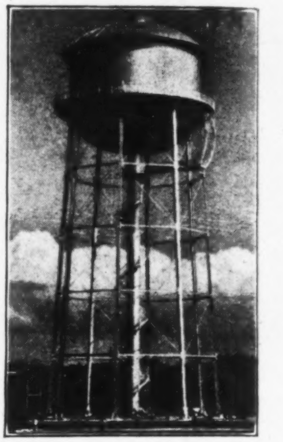

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UNCLASSIFIED (Proposed Work, Con't.)

†Pacific Northwest—FIRE ALARM SYSTEM—U. S. Eng., 810 Third Ave., Seattle, Wash., automatic fire alarm sys., night lighting sys., making test borings.

†Pacific Northwest—GASOLINE DISPENSING FACILITIES—U. S. Eng., 810 Third Ave., Seattle, Wash., gasoline dispensing facilities.

Alta., Wainwright — AIRPORT — Dominion Govt., Ottawa, Ont., airport. $200,000. Dpt. Transport, Ottawa, Ont., engr.

N. B., St. John—SHIPBUILDING PLANT—Saint John Dry Dock & Shipbuilding Co., Ltd., 7 Bayside Dr., remodeling bldgs. $60,000.

Newfoundland, St. John — WHARF — Newfoundland Govt., St. Johns, wharf. $30,000 voted. Dpt. P. Wks., St. Johns, engrs.

N. S., Lunenburg—DOCK and SLIP—Lunenburg Foundry Co. Ltd., Lunenburg, bids soon dock and slip for ship repairs. $75,000.

Ont., Brantford—SWIMMING POOL, etc.—Municipality, swimming pool, filtration sys. $30,000. G. H. Richards, Town Hall, engr.

Ont., North Bay—HANGAR—Secretary Dpt. Transport, Ottawa, hangar at airport for Bomber Ferry Command. $125,000-$150,000. J. Schofield, C. N. R. 33 McGill St., Montreal, Que., archt.

Ont., Rockcliffe (Postal Dist. Ottawa)—PARADE GROUND—Dominion Govt., Ottawa, parade ground. $25,000. Dpt. Defense for Air, Ottawa, engrs.

Que., Verdun—PLAYGROUND, etc.—Municipality, c/o J. R. French, city mgr., playground, traffic islands, boardwalk, on river front. $40,000. H. H. Hadley, City Hall, engr.

BIDS ASKED

Bids Asked September 15

†Alaska — SITE IMPROVEMENTS — Pub. Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., site imprvs. for housing, Project Alaska 50051. CD 8/11—ENR 8/13.

Bids Asked September 16

N. Y., Long Island City—PLANTING—Comr. Parks, office Dpt. Parks, Arsenal Bldg., 64 St. and 5 Ave., New York, planting Francis Lewis Blvd. from Hillside Ave. to Horace Harding Blvd., Queens Boro Contr. QG. 135-141.

N. Y., New York—TRACK SPECIAL WORK—Bd. Transportation, 250 Hudson St., track special work, frogs and switch points. Bid 17134.

†Virginia—LIGHTING SYSTEM—U. S. Eng., 33 Customhouse, Norfolk, lighting sys.

Bids Asked September 18

N. Y., New York—TRACK SPECIAL WORK—Bd. Transportation, 250 Hudson St., track special work, frogs and switch points. Bid 17190.

Tex., Tyler — WELLS — East Texas Salt Water Disposal Corp., c/o B. W. Payne, pres., Tyler, 6 wells for salt water injection program for oil field, vicinity of here. Aprox. $300,000. Est. completed project $2,252,250. CD 9/18—ENR 8/27.

Bids Asked September 24

†Mo., Chillicothe—LANDING FIELD—Civil Aeronautics Auth., 410 E. 12 St., Kansas City, Mo., intermediate landing field, Project, 543-P-8. Plans deposit $5.

Bids Asked

†Maine—WHARF—U. S. Eng., Park Square Bldg., Boston, Mass., (selected bidders) timber, concrete wharf. Inv. 175-43-Neg 57. Over $25,000. Bids extended. CD 8/28.

†New Mexico — ELECTRICAL DISTRIBUTION SYSTEM, etc.—U. S. Eng., Albuquerque, outdoor overhead electrical distr. sys., natural gas distr. lines; sanitary sewer lines; water supply, distr. sys. Plans deposit $25 ea. project.

†Oklahoma—NATURAL GAS SYSTEM—U. S. Eng., Wright Bldg., Tulsa, natural gas sys.

†Texas—UNDERGROUND UTILITIES—U. S. Eng., Fort Sam Houston, underground utilities, Spec. 42-339. Plans deposit $25.

†Texas—UTILITIES—U. S. Eng., Fort Sam Houston, underground utilities, Spec. 42-336. Plans deposit $25.

†Texas—IMPROVEMENTS—U. S. Eng., Federal Bldg., Galveston, imprvs., paving, drainage. $320,000. Plans deposit $50.

Tex., Halletsville—OIL WELL—Shell Oil Co., Inc., Shell Bldg., Houston, drilling, casing, developing 8,000 ft. oil well, vicinity here. $100,000.

Tex., Rockport—IMPROVEMENTS—Perry C. Bass & Associates, imprvs. $100,000.

Ont., North Bay—HANGAR—G. W. Yates, secy. Dpt. Transport, Ottawa, hangar, Municipal Airport, for Dominion Govt., Ottawa. $60,000. J. Schofield, 355 McGill St., Montreal, Que., archt.

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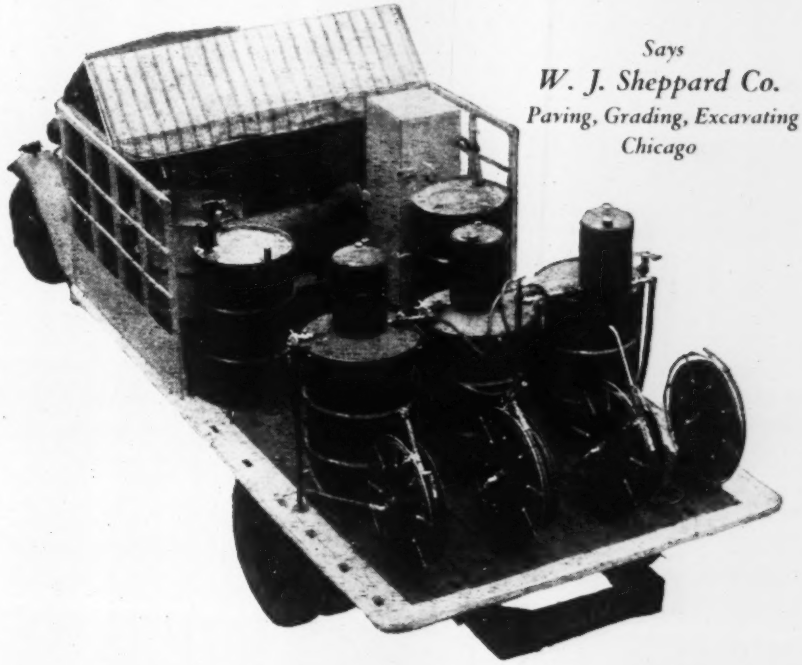

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UNCLASSIFIED (Continued)

LOW BIDDERS

†California—LANDSCAPING—Housing Auth. of City of Vallejo, Aug. 31, landscaping, at Carquinez Heights Housing, for NHA, from Leonard Coates Nurseries, Inc., 2201 The Alameda, San Jose. **$134,958.** CD 8/21.

Connecticut — ELECTRIC LIGHTING FACILITIES — W. Cox, comr. State Hy. Dpt., Hartford, Aug. 27, temporary electric lighting facilities, Trunk Line Bridge approach, Project 94-34, New London, from Theodore D. Bross & Co., 276 Franklin Ave., Rear, Hartford, **$8,574.** Bids 8/27. CD 8/21, under Roads.

Ill., Chicago—DOCK STRUCTURES, etc.—Dpt. P. Wks., O. E. Hewitt, comr., timber dock structures, Chicago River at New Orleans, West Blackhawk, W. Lemoyne and W. Eastman Sts., incl. clearing sites, removing docks, restoring sites, from Great Lakes Dredge & Dock Co., 122 S. Michigan Ave., **$46,100.**

†Louisiana—COMPASS SWINGING BASE—U. S. Eng., foot of Prytania St., New Orleans, compass swinging base, from Emmett Young, Lake Charles.

Mo., Kansas City—HANGAR—L. P. Cookingham, city mgr., City Hall, general contract T.W.A. hangar addn., from Hiram Elliott Constr. Co., 1016 Baltimore St., **$174,056*****
plumbing, heating, from Geo. R. Jorgenson, 1420 Wabash St., **$38,092*****conduit, electrical wiring from Squire Electric Co., 401 Wyandotte St., **$44,428.** Total est. over $200,000. CD 5/15—ENR 5/21.

★**†New York** — IMPROVEMENTS — U. S. Eng., 120 Wall St., New York, Sept. 2, imprvs., grading, paving, planting, from Gahagan Const. Corp., 147 Remsen St., Brooklyn, **$500,000-$1,000,000.** CD 8/20—ENR 8/27.

★**†Texas** — IMPROVEMENTS — U. S. Eng., Albuquerque, N. M., imprvs., bldgs., Inv. W-911-43-33, from L. H. Hansen & Son, c/o Mfg. Assn., Fresno, Calif., **$1,000,000-$5,000,000.** Haynes & Strange and Parkhill, and Voelcker & Dixon, 913½ Indiana Ave., Lubbock, engrs. and archts.

†Texas—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, imprvs., Spec. 42-233, from Cage Bros. & Floyd Malcolm, Lubbock. CD 9/3.

†Texas—MOTOR STORAGE SYSTEM, etc.—U. S. Eng., Fort Sam Houston, Aug. 22, installing motor fuel storage and dispensing sys., sanitary sewerage sys., water distr. sys., natural gas distr. sys., facilities, Spec. 42-250, from Anderson & Waite, 726 W. Russell St., San Antonio, **$100,000-$500,000.** CD 8/17.

CONTRACTS AWARDED

†Arizona—CONSTRUCTION—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., misc. construction, Yuma Co., to Robert L. Grosh, Hollywood, Calif., under **$50,000.**

†Arizona — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., electrical distr. sys., to J. S. Sundt & L. M. White, P. O. Box 2592, Tucson.

†Arizona—PROTECTIVE ALARM SYSTEM—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., protective alarm sys., Pima Co., to Western Electronic Sales Corp., 4031 Goodwin Ave., Los Angeles, Calif., under **$50,000.**

†Arizona — SPRINKLER SYSTEM — U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., automatic fire sprinkler sys., Pima Co., to Automatic Sprinklers of the Pacific, Inc., 5508 Alhambra Ave., Los Angeles, Calif., under **$50,000.**

†Arizona — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., electrical distr. sys., Pinal Co., to J. S. Sundt & L. M. White, Tucson, **$100,000-$500,000.**

†Arizona—TARGETS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., targets, Maricopa Co., to H. L. Royden, 2420 W. Jefferson St., Phoenix, under **$50,000.**

†Arkansas—ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., P. O. Box 97, Memphis, Tenn., electrical distr. sys., Mississippi Co., to Guy Townsend Co., Jackson, Tenn., under **$50,000.**

†Arkansas—FUELING SYSTEM—U. S. Eng., Gay Bldg., Little Rock, hydraulic fueling sys., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., under **$50,000.**

★**Arkansas**—PIPELINE—Project Five Pipeline Corp., 150 mi. pipeline from Eldorado to Helena, also 5 pumping stations, to Premier Oil Refining Co. of Texas, Gulf Refining Co., 17 Battery Pl., New York, N. Y., Socony-Vacuum Oil Co., Inc., 230 Park Ave., New York, N. Y., Texas Co., 135 E. 42 St., New York, N. Y., Lion Oil Refining Co., El Dorado, **$3,500,000.** CD 9/1—ENR 9/3.

†California—CONSTRUCTION—U. S. Eng., Wright Bldg., Sacramento, misc. construction, Contra Costa Co., to Swinnerton & Walbert Co., San Francisco, **$50,000-$100,000.**

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†California—FENCING—U. S. Eng., 751 S. Figueroa St., Los Angeles, fencing, San Bernardino Co., to Frank C. Querry, 1511 Cypress Ave., Los Angeles, under **$50,000.**

California — IMPROVEMENTS — Industrial Company, imprvs., bldg., to D. W. Nicholson, 1701 San Leandro Blvd., San Leandro. Awarded 9/1. CD 8/27—ENR 9/3.

California — IMPROVEMENTS — Industrial Company, imprvs., bldg., to Younger Constr. Co., Cheda Bldg., San Anselmo. Est. **$40,000**. H. M. Engle, 110 Sutter St., San Francisco, engr.

†California—IMPROVEMENTS—U. S. Eng., 74 New Montgomery St., San Francisco, imprvs., to Doudell Constr. Co., P. O. Box 488, San Jose. Awarded 8/31.

†California—MOTOR TRANSPORT FACILITIES—U. S. Eng., 74 New Montgomery St., San Francisco, addnl. motor transport facilities, to Floyd V. Hampshire, 246 Hawthorne St., Salinas, under **$50,000.** Awarded 8/31.

†California—OIL FACILITIES—U. S. Eng., 74 New Montgomery St., San Francisco, oil bunking facilities, to McGuire & Hester, 796 66 Ave., Oakland. Awarded 9/1.

†California — PROTECTIVE ALARM SYSTEM—U. S. Eng., 751 S. Figueroa St., Los Angeles, protective alarm sys., San Bernardino Co., to American District Telegraph Co., 610 S. Spring St., Los Angeles, under **$50,000.**

†California — STOCKADE — U. S. Eng., 74 New Montgomery St., San Francisco, stockade, to H. C. Geyer, 787 Munras Ave., Monterey. Awarded 8/31.

†California—TAXIWAYS, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, taxiways, revetments and crew shelters, Riverside Co., ters, Riverside Co., to Harvey Adair Constr. Co., El Monte, under **$50,000.**

†California — TROOP SHELTERS — U. S. Eng., 74 New Montgomery St., San Francisco, troop shelters, to James B. Allen, 1012 Elm St., San Carlos. Awarded 8/31.

†California — WALLS — U. S. Eng., 751 S. Figueroa St., Los Angeles, protective walls, San Diego Co., to Walter Trepte, 631 9 Ave., San Diego, under **$50,000.**

†California—WATCH REPORT, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, watch report and fire alarm sys., Riverside Co., to Pacific Electrical & Mechanical Co., Inc., 400 S. Boylston St., Los Angeles, under **$50,000.**

†California — FILLING STATION — U. S. Eng., 74 New Montgomery St., San Francisco, filling station, to DeLuca & Son, Inc., 1745 Filbert St., San Francisco. Awarded 9/2.

†California — GASOLINE FACILITIES — U. S. Eng., 74 New Montgomery St., San Francisco, addnl. gasoline facilities, crew shelters, to Lewis Constr. Co., 354 Hobart St., Oakland. Awarded 9/2.

†California — GASOLINE STORAGE — U. S. Eng., 74 New Montgomery St., San Francisco, A. C. gasoline storage sys., to Wells P. Goodenough, 49 Wells Ave., Palo Alto. Awarded 9/2.

Calif., Richmond — WHARF — Parr-Richmond Terminal Corp., 1 Drumm St., San Francisco, enlarging wharf facilities, incl. paving, bridge, tracking, etc., to Lee J. Immel, Box 65, Station A, Berkeley. Est. **$37,230.** E. A. Hoffman, City Hall, engr.

†Colorado—GASOLINE STORAGE, etc.—U. S. Eng., c/o Postmaster, Denver, gasoline storage, standard lubricating oil sys., pump house, Denver Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., **$50,000-$100,000.**

†Colorado — GASOLINE SYSTEM — U. S. Eng., c/o Postmaster, Denver, gasoline sys., Pueblo Co., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., **$50,000-$100,000.**

†Colorado — PAINTING — U. S. Eng., c/o Postmaster, Denver, painting bldgs., to Billingsly & Cooper, 1211 California St., Denver.

†Connecticut — COAL STORAGE FACILITIES—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., coal storage facilities, to Lane Constr. Corp., 37 Colony St., Meriden. Est. under **$50,000.** Bids 8/27.

†Connecticut—ELECTRICAL WORK—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., electrical work for storage facilities, to Springfield Electric Co., 51½ Taylor St., Springfield, Mass. Bids 8/11. CD 8/26—ENR 9/3, under Public Bldgs., CA.

†Connecticut—CONSTRUCTION—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., construction work, to Eastern Constr. Corp., 98 Lyon St., New Haven. Est. under **$150,000.** Bids 8/31. CD 8/27.

†Delaware—CONSTRUCTION—U. S. Eng., Penn Mutual Bldg., Phila., Pa., misc. construction, concrete roads, Sussex Co., to Blackwell & Son, Vandever Ave. and Mable St., Wilmington, under **$50,000.**

†Delaware—FERTILIZING and SEEDING—U. S. Eng., Penn Mutual Bldg., Phila., Pa., fertilizing, seeding, New Castle Co., to Toomey & Flynn, Bala-Cynwyd, Pa., **$50,000-$100,000.**

†Florida—HEATING SYSTEM, etc.—U. S. Eng., Courthouse & Postoffice, Jacksonville, heating and air conditioning sys., Highlands Co., to Johnson & Mann, Walgreen Bldg., St. Petersburg, under **$50,000.**

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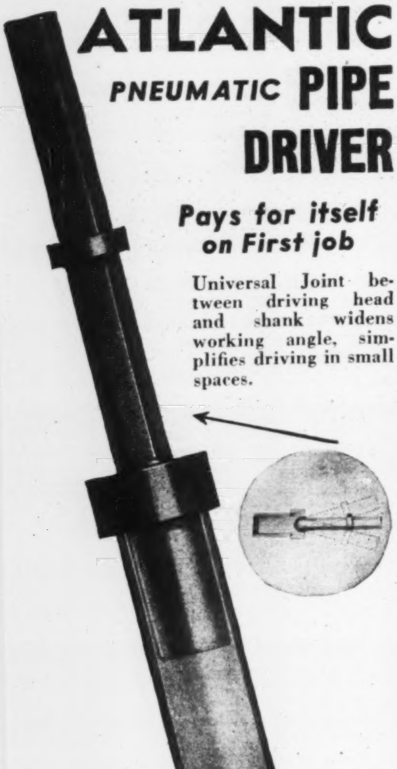

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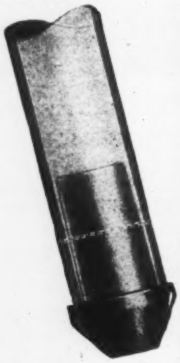

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★**†Florida** — RANGES — U. S. Eng., Courthouse & Postoffice, Jacksonville, ranges, Inv. Neg-Jax-43-124, to R. E. Clark, Inc., St. Petersburg, under **$1,000,000.** Awarded 8/25.

†Florida — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Courthouse & Postoffice, Jacksonville, electrical distr. sys., Osceola Co., to Ingalls Electric Co., 961 S.W. 2 St., Miami, under **$50,000.**

†Florida—HEATING SYSTEM, etc.—U. S. Eng., Court House, Jacksonville, insulation and heating sys., Lowndes Co., to J. N. Bray Co., Valdosta, Ga., under **$50,000.**

★**†Florida** — RUNWAYS, etc. — U. S. Eng., Jacksonville, grading, paving, runways, taxiways and hardstandings, Monroe Co., to Faulk & Coleman, J. L. Cone and J. D. Manly, Caesar Ave. and Cumberland Rd., Jacksonville, **$500,000-$1,000,000.**

†Florida — SPRIGGING, etc. — U. S. Eng., Courthouse & Postoffice, Jacksonville, sprigging, seeding, Highlands Co., to Florida Nursery & Landscape Co., Leesburg, under **$50,000.**

†Florida — SPRINKLER SYSTEM — U. S. Eng., Court House, Jacksonville, sprinkler sys., Palm Beach Co., to Miami Station, Inc., 1114 N.E. 2 St., Miami, under **$50,000.**

†Florida — UTILITIES, etc. — U. S. Eng., Court House, Jacksonville, utilities, clearing, grading, grubbing, Hillsborough Co., to Bail, Horton & Associates, 409 W. Adams St., Jacksonville, under **$50,000.**

†Georgia—AIR CONDITIONING SYSTEM—U. S. Eng., Courthouse & Postoffice, Jacksonville, Fla., installing air conditioning sys., Lowndes Co., to Charles W. Hughes, Inc., 307 Park St., Jacksonville, Fla., under **$50,000.**

†Georgia — ELECTRICAL DISTRIBUTION SYSTEM — U. S. Eng., Marietta, electrical distr. sys., to Broadway Maintenance Corp., 1st Natl. Bank Bldg., Atlanta, under **$100,000.**

†Georgia—GASOLINE FUELING SYSTEM—U. S. Eng., Courthouse & Customhouse, Mobile, Ala., gasoline fueling sys., Decatur Co., to Wm. F. Kelly Co., Inc., 415 Barrone St., New Orleans, La., **$50,000-$100,000.**

†Georgia — RUNWAYS, etc. — U. S. Eng., Postoffice Bldg., Savannah, paving runways, taxiways, apron and hardstandings, Liberty Co., to Warren Bros. Road Co., 38 Memorial Drive, Boston, Mass., **$100,000-$500,000.**

†Illinois—CONCRETE WORK—U. S. Eng., 800 Courthouse & Customhouse, St. Louis, Mo., concrete work, to E. A. Brunson Constr. Co., 4052 Forest Park Blvd., St. Louis, under **$100,000.**

†Illinois — FIRE ALARM SYSTEM — U. S. Eng., Clock Tower Bldg., Rock Island, fire alarm sys., Carroll Co., to Langford Electric Co., Inc., 706 Met. Life Bldg., Minneapolis, Minn., under **$50,000.**

†Indiana—GASOLINE FUELING SYSTEM—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., hydraulic gasoline fueling sys., Allen Co., to P. B. Arnold Co., Inc., 213 E. Main St., Fort Wayne, under **$50,000.**

†Indiana—RAILROAD SPUR TRACKS—U. S. Eng., 612 Federal Bldg., Louisville, Ky., railroad spur tracks, Bartholomew Co., to Albert J. Horth, Jr., t/a Central Engineering Co., Indianapolis, under **$50,000.**

†Iowa — ELECTRICAL INSTALLATIONS—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., electrical installations, to Flynn & Schultz, 209 S. Main St., and Schultz Electric Co., 2707 Ave. B, Council Bluffs, **$50,000.**

†Iowa—SPRINKLER SYSTEM—U. S. Eng., Tower Bldg., Rock Island, Ill., sprinkler sys., Cedar Rapids, to J. W. Darragh, 219 1 St. S.E., Cedar Rapids, under **$50,000.**

†Kansas—RAILROAD TRACKS—U. S. Eng., Albuquerque, N. M., railroad tracks, Finney Co., to McGinnis & Grafe, Waco, Tex., **$100,000-$500,000.**

†Kansas—RAILROAD TRACKS—U. S. Eng., Park Square Bldg., Boston, Mass., imprvs., Inv. 175-43-Neg. 58, to Bridge Constr. Co., 335 Water St., Augusta. Est. over **$50,000.**

†Maine—RUNWAYS, etc.—U. S. Eng., Park Square Bldg., Boston, Mass., runway exten., Aroostook Co., to Lane Constr. Corp., 37 Colony St., Meriden, Conn., **$100,000-$500,000.**

†Massachusetts — ELECTRICAL WORK — U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., electrical work for housing, to Standard Electric Co., 1020 Main St., Springfield. CD 8/26—ENR **9/3,** under Public **Bldgs., CA.**

†Massachusetts — ELECTRICAL WORK — U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., electrical work for warehouse, to Frank S. Cody, Allen St., Hanover, N. H. CD 8/17—ENR 8/20, under Public Bldgs., CA. Bids 8/8.

†Massachusetts — ELECTRICAL WORK — U. S. Eng., Park Square Bldg., Boston, electrical work, to William Gens & Son, 208 Purchase St., Boston. Bids 8/10. CD 8/14—ENR 8/20, under Public Bldgs., CA.

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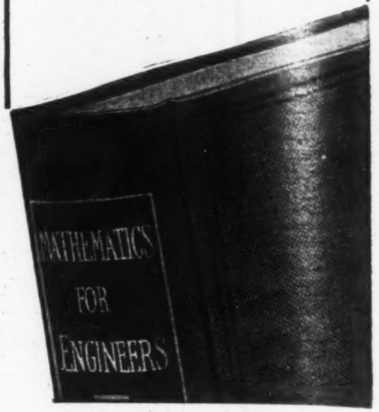

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†Massachusetts — ELECTRICAL WORK— U. S. Eng., Park Square Bldg., Boston, electrical work for housing, to Eastern Electric Co., 27 School St., Boston. Bids 8/15. CD 2/21—ENR 8/27, under Public Bldgs., CA.

†Massachusetts—GAS FUELING SYSTEM— U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., gas fueling sys., Inv. 175-43-24, to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. Est. **$25,000.**

Massachusetts — IMPROVEMENTS — Industrial Company, electrical contract for shop, to Hixon Electric Co., 22 Elkins St., Boston. CD 8/10—ENR 8/13, under CA.

†Massachusetts — IMPROVEMENTS — Industrial Company, electrical work, to Anderson Coffey Co., 22 Shawmut Ave., Boston, over **$100,000.** CD 4/7—ENR 4/9, under Public Bldgs., CA.

†Mississippi — ELECTRICAL DISTRIBUTION SYSTEM — U. S. Eng., Postoffice & Courthouse, Vicksburg, electric distr. sys., fence lighting sys., etc., to Delta Constr. Co., Clarksdale. Est. under **$50,000.**

†Missouri—CONCRETE WORK—U. S. Eng., Courthouse and Customhouse, St. Louis, Mo., concrete work, to McCormack-Evans Co., 7820 Forsythe Blvd., Clayton, St. Louis. Est. under **$100,000.**

†Missouri — RAILROAD TRACKS — U. S. Eng., P. O. Box 97, Memphis, Tenn., railroad tracks, Dunklin Co., to Russell J. Reid, 2109 N. 14 St., Birmingham, Ala., under **$50,000.**

†Nebraska—GRADING, etc.—U. S. Eng., 10 E. 17 St., Kansas City, Mo., clearing, grading, grubbing, Thayer, Fillmore and Clay Counties, to Wyatt C. Hedrick, 1st Natl. Bank Bldg., Fort Worth, Tex., under **$50,000.**

†New Hampshire — SPUR TRACK — U. S. Eng., Park Square Bldg., Boston, Mass., spur track, Hillsborough Co., to Boston & Maine Railroad Co., 150 Causeway St., Boston, Mass., under **$50,000.**

†New Jersey — LOADING PLATFORM — U. S. Eng., Penn Mutual Bldg., Phila., Pa., concrete loading platform, Salem Co., to E. J. Howell, Stacy-Trent Hotel, Trenton, under **$50,000.**

†New Mexico—FIRE ALARM SYSTEM—U. S. Eng., Albuquerque, automatic fire alarm sys., San Miguel Co., to American District Telegraph Co. of Texas, 155 6 Ave., New York, N. Y., under **$50,000.**

★**North Carolina, South Carolina, Louisiana, Alabama, Mississippi**—GASOLINE PUMPING STATIONS, etc.—Plantation Pipe Line Co., Healey Bldg., Atlanta, Ga., gasoline pump. stations at Huntersville, N. C., Blacksburg and Simpsonville, S. C., to C. F. Bennett, Kings Mountain, N. C.*** pumping stations at Fluker, La., Hawthorne and Paulding, Miss., to Foundation Co. of Mississippi, 65 Ave., Meridian, Miss.***electrical work on all projects, to White Electrical Constr. Co., 634 Antone St. N.W., Atlanta, Ga.***mechanical work on pump. stations and office in Fluker, La., Boyd, Coaling, Vincent and Heflin, Ala., to H. O. Price Co., Bartlettsville, Okla. Total est. **$3,000,000.** CD 9/2—ENR 9/10.

†Ohio—PIPING, etc.—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., installing piping, erecting air compressors, Cuyahoga Co., to The Gorman-Lavelle Plumbing & Heating Co., 4408 Carnegie St., Cleveland, under **$50,000.**

★**†Oklahoma**—ELECTRIC SYSTEM, etc.— U. S. Eng., Wright Bldg., Tulsa, electric, water, sewerage sys., grading, temporary frame bldgs., Woods Co., to Frellick-Middleton Constr. Co., Oklahoma City, **$1,000,000-$5,000,000.**

†Oklahoma—ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Wright Bldg., Tulsa, electrical distr. sys., Woods Co., to Mound City Electrical Engineering Co., 957 St. Louis St., Springfield, Mo., under **$50,000.**

†Oregon — CONSTRUCTION — U. S. Eng., Pittock Blk., Portland, misc. construction, Multnomah Co., to J. E Brown Co., Portland, under **$50,000.**

†Oregon—GASOLINE SYSTEM—U. S. Eng., Pittock Blk., Portland, gasoline storage and fueling sys., Jackson Co., to Central Calif. Constr. Co., Inc., 115 Burrows St., San Francisco, Calif., under **$50,000.**

†Oregon—LIGHTING SYSTEM—U. S. Eng., Pittock Blk., Portland, lighting sys., Multnomah Co., to Tice Electric Co., 908 S. E. Hawthorn St., Portland, under **$50,000.**

†Oregon—FIRE ALARM SYSTEM—U. S. Eng., Pittock Blk., Portland, automatic fire alarm sys., to American District Telephone Co., 155 6 Ave., New York, N. Y., **$50,000-$100,000.**

†Pennsylvania—CONCRETE FLOORS, etc.— U. S. Eng., Standard Oil Bldg., Baltimore, Md., concrete floors, platform paving, Cumberland Co., to C. W. Good, Inc., Lancaster, **$100,000-$500,000.**

†Pennsylvania—LIGHTING SYSTEMS—U. S. Eng., Penn Mutual Bldg., Phila., electrical distr. sys., street lighting, Berks Co., to Keystone Engineering Corp., 135 N. 5 St., Reading, under **$50,000.**

†South Carolina—RAILROAD SPUR—U. S. Eng., 33 Customhouse, Charleston, railroad spur, Harry Co., to Pennell & Harley, Spartanburg, **$100,000-$500,000.**

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In these critical times, the nation needs engineers of executive ability *now, today* —not five, or ten years from now! The shortage of such men is acute—even more acute than that of skilled production workers. And company heads, aware of this situation, are offering high rewards to engineers who have the necessary training in industrial management.

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However, before the engineer can take over executive responsibilities, he must acquire knowledge of the other divisions of business—of marketing, accounting and finance. He has of necessity a vast amount of technical training and experience. But in order to grasp the opportunities that present themselves today—to assume leadership on the production front—he must *also* have an understanding of practical business principles and methods.

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†South Carolina—RAILROAD SPUR TRACK—U. S. Eng., 33 Customhouse, Charleston, railroad spur track, Colleton Co., to C. Y. Thomason Co., Greenwood, $100,0[illegible]00,000.

†South Carolina — GROUND CLEARING — U. S. Eng., 33 Customhouse, Charleston, ground clearing, Spartanburg Co., to P. S. Cecil, Spartanburg, under **$50,000.**

†Tennessee—AIR CONDITIONING SYSTEM—War Dpt., Constitution Ave. at [illegible] N.W., Wash., D. C., air conditioning [illegible] plant, to T. L. Herbert & Son, 174 3 Ave., Nashville. Est. **$50,000.** Industrial company will operate.

†Tennessee—ELECTRICAL DISTRIBUTION SYSTEM, etc.—U. S. Eng., P. O. Box 97, Memphis, electrical distr. sys., primary switch station, Shelby Co., to Shelby Electric Co., Inc., 112 E. Iowa Ave., Memphis, under **$50,000.**

★**Texas and Louisiana**—OIL PIPELINE, etc.—Humble Pipe Line Co., Texas Pipe Line Co., Pure Transportation Co., Crown Central Pipe Line and Transportation Corp., Pan American Pipe Line Co. and Shell Pipe Line Corp., Box 2648, Houston, Tex., [illegible] in. line from Port Neches, Tex. to Baton Rouge, La., etc., to I. C. Little, Gulf States Bldg., Dallas, Tex., 8 in. line from Baytown to Port Neches, Tex., to O. R. Smith Contg. Co., Odessas, La. Total est. approx. **$7,000,000.** D. H. Lewis, ch. engr. Shell Pipe Line Corp. CD 9/1—ENR 9/3.

†Texas—FIRE ALARM SYSTEM—U. S. Eng., Citizens Bank Bldg., Denison, fire alarm sys., Cook Co., to City Electric Co., 2929 N. Fitzhugh St., Dallas, under **$50,000.**

†Texas — FIRE ALARM SYSTEM — U. S. Eng., San Antonio, fire alarm sys., Bell Co., to American District Telegraph Co., 155 6 Ave., New York, N. Y., under **$50,000.**

†Texas—GASOLINE SYSTEM—U. S. Eng., Federal Bldg., Galveston, A. C. gasoline, oil fueling sys., to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y., **$50,000-$100,000.** Awarded 8/27. CD 8/26—ENR 7/3.

†Texas — IMPROVEMENTS — U. S. Eng., Citizens Bank Bldg., Denison, imprvs., grading, drainage, excav., No. 257-42-82 in part, to Gifford-Hill Co., Texas Bank Bldg., Dallas, **$50,000-$100,000.** Additional to CD 4/30—ENR 5/7, under CA.

†Texas — IMPROVEMENTS — U. S. Eng., Federal Bldg., Galveston, frame bldgs., to Brown & Root, Inc., and W. S. Bellows, General Delivery, San Angelo, **$100,000-$500,000.** Additional to CD 6/23—ENR 6/25, under CA.

†Texas—RAILROAD SPUR—U. S. Eng., 25 St. and Ave. F, Galveston, railway spur, facilities, to Wm. A. Smith Const. Co., Inc., 301 Greig St., Houston, under **$50,000.**

†Texas—SPRINKLER SYSTEM—U. S. Eng., Citizens Bank Bldg., Denison, automatic sprinkler sys., Cook Co., to Century Sprinkler Corp., 305 Graham St., Richmond, Va., under **$50,000.**

†Texas—SPRINKLER SYSTEM—U. S. Eng., Fort Sam Houston, sprinkler sys., exterior piping, connections, etc., to Century Sprinkler Sys., 305 Graham St., Richmond, Va., under **$50,000.**

†Texas — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Fort Sam Houston, electrical distr. sys., Spec. 42-327, to Taylor Constr. Co., Taylor.

†Texas—GASOLINE FUELING SYSTEM—U. S. Eng., Albuquerque, gasoline fueling sys., El Paso Co., to A. P. Kasch, 107 Gregg St., Big Spring, **$50,000-$100,000.**

†Texas — IMPROVEMENTS — U. S. Eng., Fort Sam Houston, imprvs., Spec. 42-1-271, to Quisle & Andrews, 601 Builders Exchange Bldg., San Antonio, less than **$50,000;** electrical work, to Wright Bros. Electric Co., 405 Main Ave., San Antonio.

†Texas—PARKING AREA, etc.—U. S. Eng., San Antonio, parking area, sidewalks, Harris Co., to L. P. Shell, San Antonio, under **$50,000.**

†Virginia—PLANTING, etc.—U. S. Eng., 415 Postoffice & Courthouse, Norfolk, planting nursery stock, seeding, row planting, Norfolk Co., to Greenbrier Farms, Inc., Great Bridge, **$100,000-$500,000.**

†Virginia—TARGET RANGE—U. S. Eng., 415 Postoffice & Courthouse, Norfolk, repairing moving target track, Warwick Co., to Sutton Co., Inc., Oyster Point, under **$50,000.**

†Washington—FIRE ALARM SYSTEM—U. S. Eng., Pittock Blk., Portland, Ore., fire alarm sys., to American District Telephone Co., 155 6 Ave., New York, N. Y., **$50,000-$100,000.**

†Washington — FIRE ALARM SYSTEM — U. S. Eng., Pittock Blk., Portland, Ore., automatic fire alarm sys., Walla Walla Co., to American District Telegraph Co., 155 6 Ave., New York, N. Y., under **$50,000.**

†Wisconsin — ELECTRICAL INSTALLATIONS—U. S. Eng., 408 Federal Bldg., Milwaukee, electrical installations, Sauk Co., to John W. Breslin Co., 330 S. Jefferson St., Chicago, Ill., **$50,000-$100,000.**

B. C., Woodcock—AIRPORT—Dpt. Transport, Ottawa, Ont., addnl. airport development, clearing, grading, draining, hardsurfaced run-

UNCLASSIFIED (Contracts Awarded, Cont'd.)

ways, taxistrips, to Assiniboia Eng. Co., Ltd. and Dutton Bros., Ltd., 204 Lombard Bldg., Winnipeg, Man., **$423,000.**

Man., Portage la Prairie—AERODROME—Dpt. Transport, Ottawa, Ont., addnl. aerodrome development, grading, smoothing, runway addn., for E.F.T. School, to Rayner Constr. Ltd., 29 Commercial St., Toronto, Ont., about **$91,000.**

Man., Shilo—PARATROOP CAMP—Dpt. National Defense, Ottawa, Ont., paratroop camp, barracks, mess, etc., for 1st Canadian Paratroop Camp, to Bird Constr. Co., Ltd., Confederation Life Bldg., Winnipeg, about **$100,000.**

★ **Man., Terrace**—AIRPORT—Dpt. Transport, Ottawa, Ont., airport development, clearing, grubbing, grading, hardsurfaced runways, taxistrips, concrete aprons, etc., to Carter-Halls-Aldinger Co., Ltd., Royal Bank Bldg., Winnipeg, about **$1,175,000.**

★ **Man., Winnipeg**—OBSERVERS SCHOOL—Dpt. National Defense for Air, Ottawa, Ont., new accommodation, 40 bldgs., hangars, drill hall, quarters, etc., at No. 5 Air Observers School, to Claydon Co., Ltd., 253 St. Annes Rd., about **$1,000,000.** CD 8/26—ENR 9/3.

N. S., Amherst—AERODROME—Dpt. Transport, Ottawa, Ont., addnl. aerodrome development, clearing, grading, draining, runway, etc., to B. H. Williamson, 1 Edward Ave., Fairville, St. John, N. B., about **$170,000.**

N. S., Dartmouth—AIR FORCE STATION—Dpt. National Defense for Air, Ottawa, Ont., addnl. accommodation, temporary frame barracks, mess, etc., at R.C.A.F. Station, to Stewart Constr. Co., Ltd., 7 Dufferin Ave., Sherbrooke, Que., about **$400,000.**

Ont., Eugene—PIPE LINE—Ontario Hydro Electric Power Comn., 620 University St., Toronto, 3,000 ft. 46 in. creosoted wood stave pipe line, day labor, **$50,000.** O. Holden, 620 University St., Toronto, engr.

PUBLIC BUILDINGS

PROPOSED WORK

†Illinois — U. S. Eng., 520 Merchandise Mart, Chicago, architect-engineer services by Burnham & Hammond, Inc., 160 N. LaSalle St., Chicago, altering temporary frame bldgs., Cook Co.

★ **†Kentucky**—U. S. Eng., 306 Courthouse, Nashville, housing, $1,000,000-$2,000,000.

★ **†Michigan**—Pub. Housing Auth., NHA, North Interior Bldg., Wash., D. C., plans 2,500 dwelling units. WPB approved.

†New Jersey—U. S. Eng., Penn Mutual Bldg., Phila., Pa., architect-engineer service by Wenner & Chanec, Architects Bldg., Phila., Pa., 1 story, frame military housing.

†New Mexico — U. S. Eng., Albuquerque, temporary bldgs., utilities, fueling sys., under $50,000; housing, utilities, grading, walks, drives, etc., under $500,000.

†N. Y., Dunkirk—Brooks Memorial Hospital, M. Rowe, chn., new bids soon on revised plans 2 story bldg. addn., Docket N.Y. 30-171. $189,000. **FWA.** W. M. Gannon, 2637 Main St., Niagara Falls, archt. CD 4/1—ENR 4/9.

†N. C., Gastonia—State Textile Institute, J. B. Vogler, trustee, Gastonia, machine shop. $32,700 **FWA.**

★ **†Oklahoma** — U. S. Eng., Wright Bldg., Tulsa, military bldgs., streets, roads, underground utilities, sewage treatment plants, electrical distr. sys., fencing: Under $3,000,000.

†Oregon—Cedar Mills School Dist., plans by C. N. Freeman, Postal Bldg., Portland, school addn., Docket 35-147. $14,000. **FWA.**

†Ore., Portland—School Dist. 8, Cornelius Pass and Skyline Blvd., plans by Barrett & Logan, 1940 S.W. Fourth Ave., 1 story, frame school addn., Docket 35-146. $22,700. **FWA.**

†South Dakota—U. S. Eng., 1709 Jackson St., Omaha, Neb., architect-engineer services by C. M. Stanley, Muscatine, Ia., temporary frame bldgs., Hughes Co.

†Texas—U. S. Eng., Fort Sam Houston, bldgs. $350,000.

†Tex., Bastrop—Federal Works Agency, Maverick Bldg., San Antonio, recreation center, Tex. 41-539F, $92,500.

★ **†Tex., El Paso**—Masonic Hospital Assn., hospital addn., nurses home, Tex. 41-522F. $592,130. **FWA.** Frost & Frost, El Paso Natl. Bank Bldg., El Paso, archts.

†Tex., San Antonio — City, public health center, facilities, addn., remodeling. $100,000. **FWA.** Spillman & Spillman, Hicks Bldg., San Antonio, archts.

†Washington—U. S. Eng., 810 Third Ave., Seattle, plans by Bebb & Jones, Hoge Bldg., Seattle, bldgs. M. O. Sylliaasen & L. Bouillon, 1411 Fourth Ave., Seattle, engrs.

†Wash., Walla Walla — Federal Works Agency, Alaska Bldg., Seattle, renovating bldg., for USO center. $35,325.

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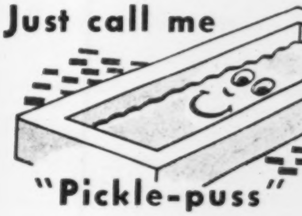

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

†Wyoming — Bureau Mines, Dpt. Interior, C St. between 18 and 19 Sts. N.W., Wash., D. C., plant. $300,000.

★**†Wyoming**—U. S. Eng., 1709 Jackson St., Omaha, Neb., military housing. Under $1,000,000.

†Pacific Northwest—U. S. Eng., 810 Third Ave., Seattle, Wash., housing facilities.

†Alaska, Ketchikan—City, fire hall. $75,000. **FWA.**

Alta., Camrose—Municipality, hospital. $150,000.

Newfoundland, St. Johns—Govt. of Newfoundland, St. Johns, wing to General Hospital. $285,000. Dpt. P. Wks., St. Johns, engrs.

Ont., Brockville—Dominion Govt., Ottawa, plans by Dpt. National Defense, Ottawa, 49 bldgs. for military use. $316,000. Dpt. Munitions & Supply, Ottawa, engrs.

Ont., Cornwall—Secretary Dpt. Munitions & Supply, Ottawa, Ont., bids soon, addnl. accommodations, hospital addn., sleeping huts, dining and kitchen facilities, for Dpt. Natl. Defense, Ottawa, Ont. $175,000. CD 4/2—ENR 4/16.

Ont., Cornwall—Wartime Housing Ltd., 55 York St., Toronto, bids soon, 100 houses. $225,000.

Ont., St. Catharines—Wartime Housing Ltd., 55 York St., Toronto, 50 single dwelling houses. $150,000.

Ont., Toronto—Bd. Governors, c/o Toronto East General Hospital, Coxwell Ave. near Sammon Ave., bids soon 44x77x120 ft., 25x43x84 ft. and 33x33x45 ft. hospital extens., etc. $377,000. K. S. Gilles, City Hall, archt. CD 5/1—ENR 5/14.

Ont., Welland — Welland County Hospital Bd., 24 Bold St., plans by R. I. MacBeth, 104 Queen St., St. Catharines, four 3 story hospital addns. $163,000.

Que., Montreal—Provincial Govt., Quebec City, bids soon altering bldg., St. Denis St. near St. Catherine St. for offices. $200,000. L. Fontaine, c/o owner, archt.

Que., Quebec City—Provincial Govt., Quebec City, 2 reform schools. Architect, c/o Provincial Secretary, Quebec City. Dpt. P. Wks., Quebec City, engrs.

Que., Quebec City—Provincial Govt., Quebec City, addn. Women's jail, Gouin Rd. $150,000. Architect c/o Dpt. Attorney General, Quebec City. Dpt. P. Wks., Quebec City, engrs.

Que., Sherbrooke—Sherbrooke City Transit Co., 33 King St. W. bids soon, 125x200 ft. autobus garage.

Sask., Saskatoon—Dominion Govt., Ottawa, Ont., naval barracks, etc. $200,000. Dpt. Naval Affairs, Ottawa, Ont., archts. Dpt. Munitions & Supply, Ottawa, Ont., engrs.

BIDS ASKED

Bids Asked September 29

★**†Mississippi** — U. S. Eng., Postoffice & Courthouse, Vicksburg, bldgs., utilities, roads, grading. Over $1,000,000.

Bids Asked

★**†Oklahoma**—U. S. E g., Wright Bldg., Tulsa, military bldgs. $2,000,000. Plans deposit $50.

LOW BIDDERS

†D. C., Wash.—Natl. Park Service, Interior Dpt., Wash., Aug. 28, conversion greenhouses into mechanical shops and garages, No. 1083, from E. L. Daniels Co., Arlington, Va. **$65,972.**

★**†Texas**—U. S. Eng., Citizens Bank Bldg., Denison, housing, from R. J. Brydon & J. S. Churchill, 5836 Reiger St., Dallas, **$1,000,000-$5,000,000.**

CONTRACTS AWARDED

†Alabama — Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., housing, to W. F. Holt & Son, 105 16 Ave. S., Nashville, Tenn. Hart & Russell, 3rd Nat. Bank Bldg., Nashville, Tenn., archts.

†Arizona—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., temporary frame bldgs., Pinal Co., to E. W. Duhame Constr. Co., 3719 N. Central Ave., **Phoenix, $100,000-$500,000.**

†Arizona—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., supplemental contract hospital group, etc., to J. S. Sundt & L. M. White, P. O. Box 2592, Tucson, less than **$500,000.** Awarded 8/29.

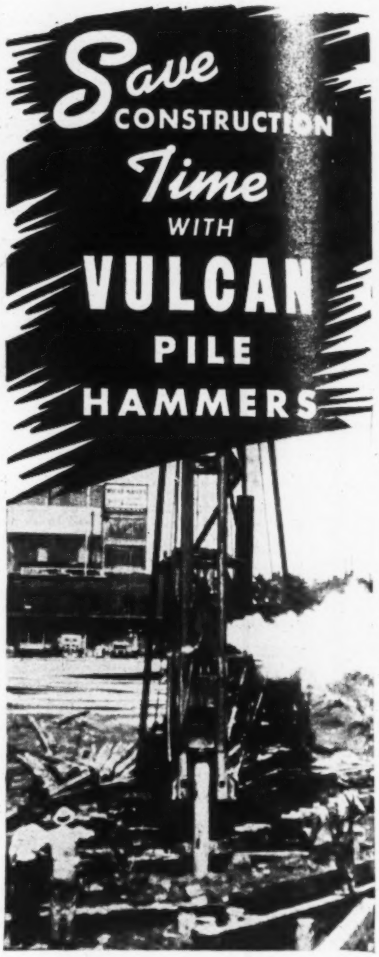
★**†Arkansas**—U. S. Eng., P. O. Box 97, Memphis, Tenn., bldgs., to G. A. Stuck & Sons, Jonesboro. Est. under **$1,000,000.**

†California—U. S. Eng., 751 S. Figueroa St., Los Angeles, bldgs., utilities, electrical distr. sys., paving, No. 194, to Sam M. Duff, 733 W. 14 St., Long Beach, over **$100,000.** Awarded 8/29.

†California—U. S. Eng., 74 New Montgomery St., San Francisco, motor repair and servicing facilities, to Coast Counties Constr. Co., 150 Towt St., Salinas. Awarded 9/1.

†California—U. S. Eng., 74 New Montgomery St., San Francisco, service bldgs., facilities, to Oliver M. Rousseau, 321 Kearny St., San Francisco.

†California — Housing Auth. of Marin Co., Cheda Bldg., San Rafael, electrical work for dormitory units, for NHA, to Norman A. Russell, Box 455, Santa Rosa, CD 6/23—ENR



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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

6/25, under CA; electrical work for demountable units, apartments, to American Electric Constr. Co., 462 Bryant St., San Francisco, CD 6/18—ENR 6/25, under CA.

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, temporary frame bldgs., streets, parking areas, Riverside Co., to Arthur Malcolm and Vido S. Price, North Hollywood, **$100,000-$500,000.**

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, electrical work for rehabilitation bldg., to Central Electric Co., 179 Minna St., San Francisco. CD 8/21, under CA.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, electrical work for cold storage facilities, to Weber & Conroy, 3211 Mission St., San Francisco. CD 7/30—ENR 8/6, under CA.

†**Colorado**—U. S. Eng., c/o Postmaster, Denver, temporary frame bldgs., Denver Co., to Brown & Schrepferman, 19800 Penn. St., Denver, **$100,000-$500,000.**

†**Connecticut**—Industrial Co., plant, to Hewlett Constr. Co., 1385 Iranistan Ave., Bridgeport. Est. **$40,000.** Federally financed.

★†**Connecticut**—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., housing, Conn. 6033, to A. Barbaresi & Son, Inc., 20 E. First St., Mount Vernon, **$1,117,500.** Bid 8/24. CD 8/28—ENR 9/3.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, temporary frame bldgs., Monroe Co., to Demgaard & Preston Bldgs., Inc., Coral Gables, **$100,000-$500,000.**

†**Florida**—U. S. Eng., Courthouse & Customhouse, Mobile, Ala., civilian war housing, to H. J. Koski, Selma, Ala. CD 826—ENR 9/3.

†**Florida**—U. S. Eng., Courthouse & Customhouse, Mobile, Ala., laundry steam plant, to The Jordan Co., Columbus, Ga.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, altering bldgs., to A. L. Clayton, Inc., West Bldg., Jacksonville.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, temporary frame bldgs., Hillsborough Co., to Palmer Engineering & Construction Co., Cassatt Ave., Jacksonville, **$100,000-$500,000.**

★†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, bldgs., Inv. Neg.-Jax-43-108, to Smith Peaken Constr. Co., Miami Beach, under **$1,000,000.** Awarded 8/25.

†**Florida**—U. S. Eng., Courthouse & Postoffice, Jacksonville, temporary frame bldgs., compass swinging base, Jackson Co., to Paul Smith Constr. Co., 310 N. Rome Ave., Tampa. **$100,000-$500,000.**

★†**Georgia**—U. S. Eng., Marietta, heating, ventilating, to Kirby-Saunders, Inc., 901 Volunteer Bldg., Atlanta, over **$1,000,000.**

★†**Georgia**—U. S. Eng., Postoffice & Courthouse, Jacksonville, Fla., bldg., Inv. Neg. ME-43-4, to Prince E. Jinright, Thomasville, under **$1,000,000.** Awarded 8/22.

★†**Georgia**—U. S. Eng., Courthouse & Postoffice, Jacksonville, Fla., bldgs., to J. N. Bray Constr. Co., Valdosta, under **$1,000,000.**

†**Georgia**—U. S. Eng., Postoffice Bldg., Savannah, bldg., to Newman Const. Co., LaGrange.

†**Maine**—U. S. Eng., Park Square Bldg., Boston, Mass., electrical work for bldgs., Inv. 175-43-Neg 46, to Frank T. Cody Co., Allen St., Hanover, N. H.

†**Maryland**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., bldgs., to Housing Eng. Corp., 6 W. Eager St., Baltimore.

†**Massachusetts** — U. S. Eng., Park Square Bldg., Boston, electrical work for military housing, Inv. 175-43-29, to Freed Malins Electric Co., 47 Bowker St., Boston. CD 8/19—ENR 8/27, under CA.

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, temporary bldgs., utilities, removal existing tent frames, at Rouge Park, Wayne Co., to R. B. Culbertson Co., 3842 W. Grand Blvd., Detroit, under **$1,000,000.**

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, mobilization and theatre of operations type bldgs., Alpena Co., to A. H. Proksch, Iron River, under **$1,000,000.**

★†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, mobilization and theatre of operations type bldgs., Iosco Co., to Dekoning Constr. Co., Kalamazoo, under **$1,000,000.**

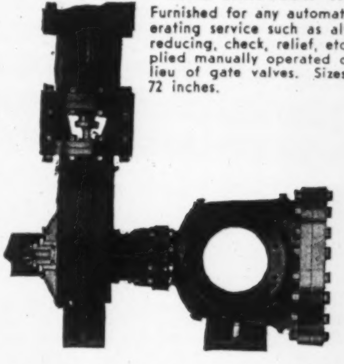
†**Mississippi**—U. S. Eng., Courthouse & Customhouse, Mobile, Ala., civilian housing for women, to J. G. Day & Harrison Richardson, 2400 5 Ave., S., Birmingham, Ala.

†**Mississippi**—U. S. Eng., Courthouse & Customhouse, Mobile, Ala., temporary frame bldgs., to Southeastern Mfg. Co., Tuscaloosa, Ala.

★†**Mississippi**—U. S. Eng., Courthouse & Customhouse, Mobile, Ala., hospital, to R. P. Farnsworth & Co., Inc., 1515 S. Salecedo St., New Orleans, La., est. under **$5,000,000.** CD 8/20—ENR 8/27.

†**Nebraska**—U. S. Eng., 1709 Jackson St., Omaha, temporary frame bldgs., Cheyenne Co., to The Gear Co., Grand Island, **$100,000-$500,000.**

†**New York**—U. S. Eng., Chimes Bldg., Syracuse, temporary frame bldgs., Onondaga Co., to W. J. Burns Co., 205 Harrison St., Syracuse, **$100,000-$500,000.**



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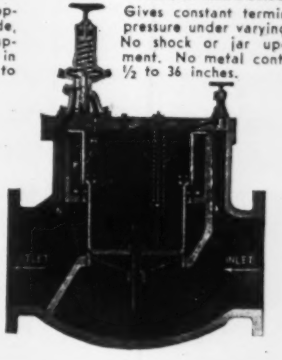

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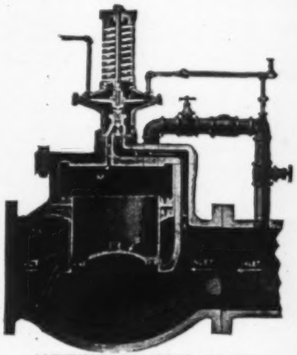

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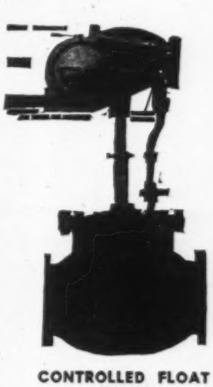

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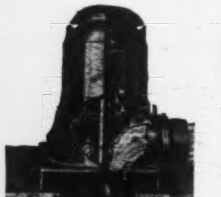

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†North Carolina—U. S. Eng., 308 Customhouse, Wilmington, bldgs., to R. H. Pinnix, Gastonia. Bids 8/13.

†Ohio—U. S. Eng., Postoffice & Courthouse, Cincinnati, temporary frame bldgs., facilities, Hamilton Co., to Guentter-Reinhard Co., 2023 Dunlap St., Cincinnati, **$100,000-$500,000.**

★ **†Ohio**—U. S. Eng., 700 Union Guardian Bldg., Detroit, Mich., installing 132 KV step-down substation and electrical work, Cuyahoga Co., to Gustav Hirsch Organization, 310 W. Broad St., Columbus, under **$1,000,000.**

†Oregon—U. S. Eng., Pittock Blk., Portland, bldgs., water, sewerage sys., railroad, to Halverson Constr. Co., Billings, Mont., **$100,000-$500,000.**

†Rhode Island—U. S. Eng., 819 Industrial Trust Bldg., Providence, electrical work for housing, to Liberty Electric Co., 49 Weybosset St., Providence. Awarded 9/2. CD 8/24—ENR 8/27, **under CA.**

†South Dakota—U. S. Eng., 1709 Jackson St., Omaha, Neb., temporary frame bldgs., steam plant, Minnehaha Co., to Syndicate Contractors, Sioux Falls, **$100,000-$500,000.**

★ **†South Dakota**—U. S. Eng., Administration Bldg., Fort Peck, Mont., temporary frame bldgs., Fall River Co., to Kileen & Wille Constr. Co., Superior Wis., **$500,000-$1,000,000.**

★ **†Tennessee**—U. S. Eng., P. O. Box 97, Memphis, misc. bldgs., to Lee Constr. Co., 1467 Lamar St., Memphis, under **$2,000,000.**

†Tennessee—U. S. Eng., 494 Spring St., N.W., Atlanta, Ga., addnl. temporary frame bldgs., Henry Co., to T. M. Strider & Co., Cotton States Bldg., Nashville, **$100,000-$500,000.**

★ **†Texas**—Federal Housing Auth., Electric Bldg., Fort Worth, housing, Tex. 41-221, to J. J. Bollinger Constr. Co., c/o Braniff Bldg., Oklahoma City, Okla., **$1,077,400.** CD 8/28—ENR 9/3, under LB.

★ **†Texas** — Industrial Company, bldgs., to Foster-Wheeler Corp., 624 Shell Bldg., Houston, **$4,000,000;** bldgs., to Tellepsen Const. Co., 3900 Clay St., Houston, **$225,000;** site preparation, grading, drainage, to P. F. Eller, 227 Lennox Ave., Houston, **$280,000. Grand total, $4,505,000. Defense Plant Corporation** will finance. CD 6/9—ENR 6/11.

†Texas—U. S. Eng., Fort Sam Houston, Citizens Bank Bldg., Ft. Sam Houston, housing, Spec. 42-303, to Lee Christy, Builders Exchange Bldg., San Antonio, **$100,000-$500,000.** Awarded **8/29.**

†Texas—U. S. Eng., Fort Sam Houston, civilian housing, Spec. 42-307, to E. F. Crain & J. L. McBride, Constr. Bldg., Dallas, **$100,000-$500,000.** Bids 8/29, awarded 8/31. CD **8/24.**

†Texas—U. S. Eng., Citizens Bank Bldg., Denison, frame bldgs., to Skyline Builders, Inc. 522 Ave. J, **Dallas, $100,000-$500,000.** Awarded 8/29.

†Texas—U. S. Eng., Fort Sam Houston, administration bldgs., repair shops, oilhouses, etc., Spec. 42-305, to Miller & Rosson, Kerrville, **$100,000-$500,000.** Bids 8/20, awarded 8/29. CD 8/14—ENR 8/20.

†Texas—Defense Plant Corp., 811 Vermont Ave. N.W., Wash., D. C., addnl. underground utilities for plant to Tellepsen Constr. Co., 3200 Clay Ave., Houston, **$92,000.** Awarded 8/31. Industrial company will operate.

†Texas—U. S. Eng., Citizens Bank Bldg., Denison, addnl. temporary frame bldgs., Lamar Co., to Robert E. McKee, 1918 Texas St., El Paso, **$100,000-$500,000.**

†Texas—U. S. Eng., Federal Bldg., Galveston, temporary frame bldgs., etc., Limestone Co., to Thomas Bate & Sons, 1107 Girard St., Houston, and to Albert Meyerson Co., 1010 Wheeler St., Houston, ea. contract **$100,000-$500,000.**

★ **†Utah—U. S. Eng., Salt Lake City, Utah,** temporary frame bldgs., Weber Co., to MacIsaac, Menke & Pozzo, 3445 Union Pacific Ave., Los Angeles, Calif., **$1,000,000-$5,000,000.**

†Utah—U. S. Eng., 32 Exchange Pl., Salt Lake City, temporary frame bldgs., fueling sys., Tooele Co., to Harrison & Dorman, Inc., **13 S & 4 W St., Salt Lake City, $100,000-$500,000.**

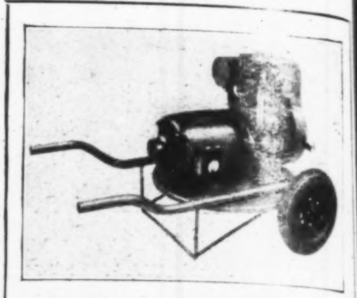
★ **†Utah**—Columbia Steel Co., Russ Bldg., San Francisco, Calif., housing, incl. water, sewer, electric power facilities, grading, streets, to W. E. Ryberg Co., Terminal Bldg., Salt Lake City, and Strong & Grant, Springville. Est. between **$2,000,000-$3,000,000.** Defense Plant Corp. will finance.

†Wisconsin—Industrial Company, electrical work for factory addn., to Kaufman Elec. Co., Fond du Lac. Defense plant Corp. will finance. CD 5/1—ENR 5/7, under CA.

†Pacific Northwest—U. S. Eng., 810 Third Ave., Seattle, Wash., bldg., to Norge Constr. Co., and A. J. Goerig, 305 Lloyd Bldg., Seattle, Wash., **$100,000-$500,000.**

N. B., Moncton—Dpt. National Defense for Air, Ottawa, Ont., storage accommodation at Equip. Depot for S.F.T. School 8 and Equip. Depot 5, to New Brunswick Contractors, Ltd., 604 Queen St., Fredericton, about **$150,000.**

N. B., St. John—National Harbors Bd., Ottawa, Ont., rein.-con. transit shed and annex,



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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

St. John Harbor, to Acme Constr. Co., Ltd., 45 Canterbury St., about **$300,000-$350,000.** Bids 8/10. CD 8/6.

Ont., Brantford—Wartime Housing Ltd., 55 York St., Toronto, 2 staff houses and women's communal centre, to W. H. Cooper Constr. Co., Ltd., 306 Medical Arts Bldg., Hamilton, about **$190,000.** Bids 8/19. CD 8/12.

Ont., Brantford—Wartime Housing Ltd., 55 York St., Toronto, two hundred 1 story frame dwellings, own forces under supervision D. Beam. **$200,000.** Bids 8/19. CD 8/12.

Ont., Dundas—Wartime Housing Ltd., 55 York St., Toronto, 50 single family dwellings, day labor. Est. **$150,000.** CD 7/29—ENR 8/6.

Ont., Fort William—Wartime Housing Ltd., 55 York St., Toronto, 100 addnl. houses, Christina and Mary Sts., own forces. **$225,000.** CD 5/15.

Ont., Long Branch (Toronto) — Wartime Housing Ltd., 55 York St., Toronto, 75 houses, to L. C. Scott Constr. Co., Ltd., 330 Bay St., Toronto, about **$165,000.**

Ont., Malton—Wartime Housing Ltd., 55 York St., Toronto, 100 addnl. houses, to L. C. Scott Constr. Co., Ltd., 330 Bay St., Toronto, about **$225,000.**

Ont., Ottawa—Dpt. P. Wks., Ottawa, 3 semi-permanent bldgs., administration bldg., drill hall and barracks, mess hall, on Dows Lake site, for Royal Canadian Navy, to Doran Constr. Co., Ltd., 78 Bank St., about **$300,000.** C. D. Sutherland, c/o owner, ch. archt.

Ont., Rockcliffe (Ottawa)—Dominion Govt., Ottawa, drill hall, ground instruction school, canteen, officers' quarters, to Henri Dagenais, 186 St. Patrick St., Ottawa. Est. **$200,000.** Dpt. Natl. Defense for Air, Jackson Bldg., Ottawa, archts. Bids 8/14.

Que., La Malbaie—Rev. Soeurs de la Charite (de Quebec) 5 St. Oliver St., Quebec City, hospital, to Albert Bedard, 132 St. Patrick St., Quebec City. **$256,000.** CD 4/7—ENR 4/9.

Que., Richmond—Protestant School Comn., school, to W. G. Hunt & Co., Ltd., 1405 Bishop St., Montreal. Est. **$150,000.** CD 6/9.

COMMERCIAL BUILDINGS

PROPOSED WORK

Ill., Granite City—Morris Realty Co., Granite City, forty-four 1 story, bsmnt., frame bungalows, concrete fdns., 28 and Ralph Sts., own forces.

Me., Portland—Victory Development Co., 477 Congress St., 250 frame houses, 2 and 4 facilities each. **Over $150,000.**

N. C., Charlotte—Ed Mellon Co., Thos. M. Shelton, Jr., pres., 106 W. Trade St., plans by W. W. Hook, Commercial Bank Bldg., 3 story commercial bldg., 110-114 W. Trade St.

Tex., Bastrop—ACA Housing Co., Bastrop, c/o Ash-Crow-Allbright, 75 frame dwellings, $240,000; natural gas distr. lines, facilities, $25,000; sanitary sewer collecting lines, facilities, $25,000.

CONTRACTS AWARDED

Calif., Inglewood—Gage Corp., 468 N. Camden Dr., Beverly Hills, 10 triplex and eight 4 unit, frame, stucco apartment bldgs., Maple, Grevilla, Arbor Vitae and 94 Sts. Owner builds. **$190,000.** W. J. Gage, 468 N. Camden Dr., Beverly Hills, archt.

Calif., Oakland—Brookfield Corp., 1 Sloat Blvd., San Francisco, eighty-seven 1 story residences, Caswell and Burlwood Aves. Owner builds. **$217,500.** H. C. Stoner, 1 Sloat Blvd., San Francisco, archts.

Mass., Springfield—Springfield Gardens, Inc., Norris Stich, Seymour St. and Boston Rd., fifty-four 2 story, 30x34 ft. frame houses, Seymour St. and Pheland Ave. Owner builds. **$162,000.** J. E. Kane, 54 Church St., Hartford, Conn., archt.

Wis., Greenfield (Milwaukee, P. O.)—Stack Realty & Development Co., S. 53 St. and W. Dakota St., electrical work for 38 residences and 4 garages, to B. H. Barg Electric Co., 2808 W. Forest Home Ave., Milwaukee. CD 8/28—ENR 9/3, under CA.

Wis., Milwaukee—J. D. Edwards, 3625 S. 46 St., 9 duplex flats and garages. Owner builds. Electrical contract, to L. J. Fieldhack, 2628 B. W. Fond du Lac Ave.

Wis., Milwaukee—Pioneer Builders, 2309 W. Fond du Lac Ave., three 2 story, 34x43 ft. apartment bldgs., Atkinson Ave. Owner builds. Electrical contract, to North Side Electric Co., 4053 N. 12 St.

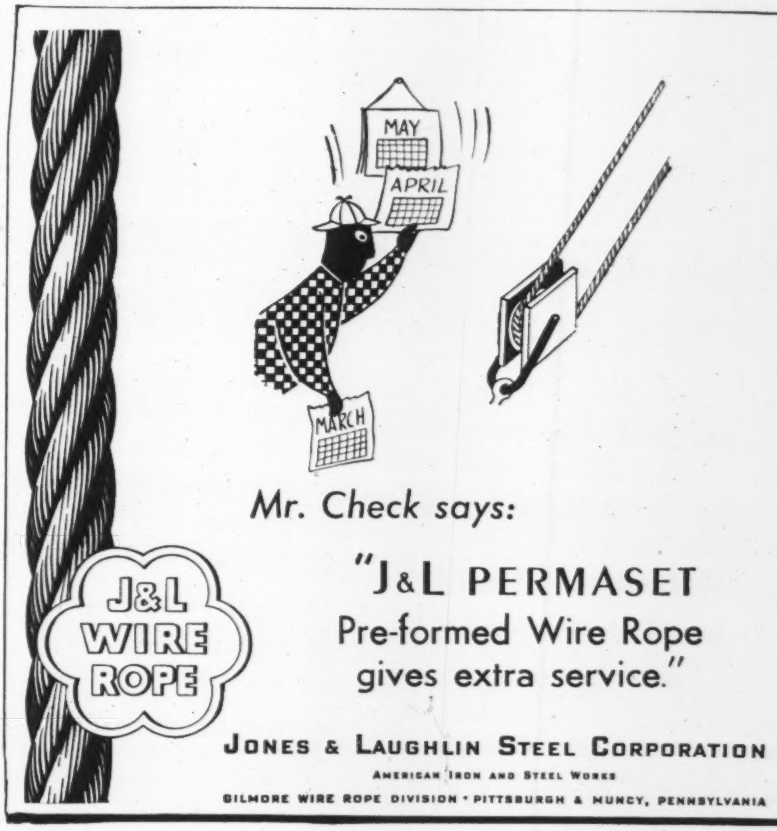
INDUSTRIAL BUILDINGS

PROPOSED WORK

Calif., Sacramento—WAREHOUSE — Southern Pacific R.R. Co., W. H. Kirkbride, ch. engr., 65 Market St., San Francisco, rebuilding warehouse. $55,000.

Calif., San Bernardino — PLANT — Culligan Zeolite Co., 4642 N. Ravenswood St., Chicago, Ill., plant, near here. $200,000.

Ia., Cedar Rapids—FACTORY—Klinger Wall Paper & Paint Co., 117 2 Ave. S. E., factory. $100,000.



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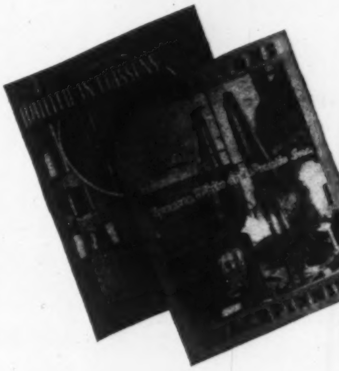

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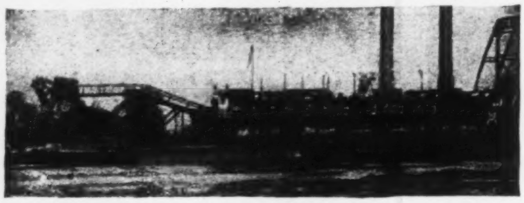

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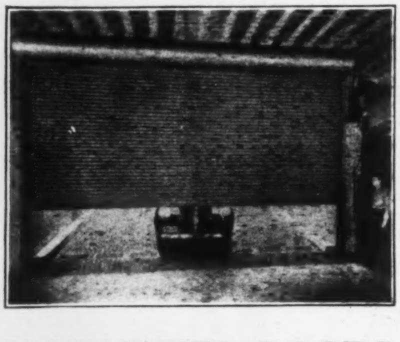

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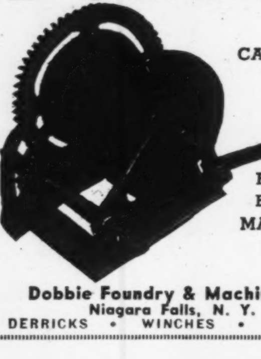

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INDUSTRIAL BLDGS. (Pro[illegible] Work, Cont'd.)

★**Minn., St. Paul**—POWER PL[illegible]—Northern States Power Co., 15 S[illegible] Minneapolis, G. O. House, mgr., 5 [illegible] Wabasha St., St. Paul, preparing plans [illegible] structure rein.-con., brick power plant at [illegible] Bridge, Mississippi River. Est. com[illegible] project $5,000,000.

Okla., Oklahoma City—LA[illegible]Y—New State Laundry & Zoric Cleaners, [illegible] F. Heidbrink, mgr., 120 N. Francis St., [illegible] building laundry. $200,000.

Tex., Decatur—PLANT—Texas [illegible] Industries, Inc., Decatur, repla[illegible] dehydration plant recently destroyed by [illegible] $50,000.

Tex., San Antonio — PLANT—[illegible] Universal Concrete Pipe Co., Kemper and Trinity St., bids soon plant. $45,000.

B. C., Vancouver—MILL—Pa[illegible] Veneer Moulding Co., Ltd., 640 W. Pend[illegible] St., saw mill, etc.

N. B., Grand Falls—PLANT—[illegible] Potato Products Ltd., Grand Falls, 1 st[illegible] bsmnt., 50x133 ft. dehydration plant. $4[illegible]

Ont., Eastview—PLANT—North[illegible] Tool & Gauge Co., Ltd., 7 McArthur Rd., 60x300 ft. concrete, wood plant, 15 ft. high. $[illegible]

Ont., Leaside—PLANT—L. S. and A. Robertson Canada Ltd., 7 Laird Dr., plans by Margison & Babcock, 210 W. Dundas St., Toronto, plant addn. $70,000.

Ont., Timmins—MILL—Hollinger Consolidated Mines, Ltd., Timmins, bids soon 500 ton mill, Kamiskotia Dist. $100,000.

Ont., Toronto—PLANT—Ajax Tungsten & Molybdenite Mines, Ltd., c/o J. D. Reilly, 11[illegible] Yonge St., plant. $60,000.

Ont., Toronto—PLANT—Vapour Proof Products, Ltd., c/o L. B. Campbell, Sterling Tower Bldg., plant. $50,000.

Ont., Toronto—PLANT—Williams Welding Co., Ltd., 682 Richmond St., plant exten.

Quebec—PLANT—Dr. Monte Wladover, c/o National Construction Council, Ottawa, Ont., wood treating plant. $50,000.

Que., Beloeil — PLANT — Canadian Industries, Ltd., 1135 Beaver Hall Hill, Montreal, plant addn. $100,000.

Que., Sherbrooke—FOUNDRY—H. G. James, archt., 36 Portland St., bids soon several wooden foundry bldgs., Des Forges St. plant, for Canadian Ingersoll-Rand Co., Ltd., 620 Cathcart St., Montreal. Est. $330,000.

Que., Sorel—FACTORY—L. Lachapelle, 95 George St., 2 story, 40x119 ft., brick factory, concrete fdn., Prince St. $40,000.

Que., Three Rivers—PLANT—Wayagamack Pulp & Paper Co., Ltd., Sun Life Bldg., Montreal, bids soon repairing plant. $50,000.

Que., Ville Lasalle (Montreal)—PLANT—Distillers Corp., Ltd., Lafleur Ave., bids soon, altering plant. $136,500. B. R. Perry, 620 Cathcart St., Montreal, engr.

Que., Ville St. Pierre—PLANT—Canadian Car & Fdry. Co., Ltd., 621 W. Craig St., Montreal, plans by Spence & Bruce, 2063 Union Ave., Montreal, 33x39x73 ft. brick plant addn., concrete fdn. $100,000. CD 1/7—ENR 1/22.

BIDS ASKED

Ont., Hamilton—PLANT—C. D. Howe, Ltd., engrs., Pigott Bldg., plant, Industrial Park, for Dominion Foundries & Steel Co., Ltd., 7 Depew St. $100,000. Prack & Prack, Pigott Bldg., archts.

LOW BIDDERS

La., New Orleans—WAREHOUSE—Moise H. Goldstein & Associates, archts., American Bank Bldg., 2 story, 44x104 ft. masonry construction warehouse, for River Terminals Corp., Cotton Exch. Bldg., from J. Gordon Lee, Carondelet Bldg. Bids 8/25. CD 8/17—ENR 8/20.

CONTRACTS AWARDED

California — WAREHOUSE, etc.—Industrial Company, frame warehouse, personnel bldg., to C. M. Teigland, 773 University Ave., Berkeley. Est. over **$140,000.** CD 8/20—ENR 8/27.

Calif., Monterey—WAREHOUSE and CANNERY—Oxnard Canners, Inc., Port Hueneme, electrical contract 2 story, 60x125 ft. and 2 story cannery, to Searle Electric Co., 340 Tyler St. CD 8/18—ENR 8/20, under CA.

Connecticut—PLANT — Industrial Company, electrical work for plant, to Bauer & Co., Inc., 844 Windsor St., Hartford. CD 6/30—ENR 7/2, under CA.

Conn., Bridgeport—FACTORY—Bridgeport Brass Co., 30 Grand St., electrical contract for factory, Walter St., to Watson-Flagg Eng. Co., 140 Cedar St., New York, N. Y. CD 8/4—ENR 8/6, under CA.

Conn., Stamford—FACTORY—Schick, Inc., 45 Garden St., electrical contract 1 story, 62x200 ft. factory, to John Drenckhalm, 882 Hope St. CD 8/4—ENR 8/6, under CA.

La., New Orleans—POWER HOUSE—New Orleans Pub. Service, Inc., 317 Baronne St., power house addns., alternations, to Boh Bros. Constr. Co., 2400 Cypress St. Est. **$189,000.** CD 8/6—ENR 8/13.

Mass., Ayer—WAREHOUSE—Joseph P. Sullivan, Inc., Groton St., 1 story, 80x175 ft. cold storage warehouse, to Casper J. Jenney, Jr., Everett St., Concord. Est. **$40,000.** CD 8/14—ENR 8/20.

INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

Mass., Springfield—WAREHOUSE—Indian Motorcycle Co., 837 State St., electrical contract 4 story, 30x60 ft. brick, concrete warehouse, to R. A. Turner, Inc., 440 Worthington St., **$2,000.** CD 7/10—ENR 7/16, under CA.

★**N. Y., Freeport**—FACTORY—Columbian Bronze Corp., 216 N. Main St., brick, steel factory addn., to Roger & McCay, Inc., 19 W. 44 St., New York. Est. **$500,000.** O. B. Smith, South Terrace, Short Hills, N. J., archt.

O., Columbus—FACTORY, etc.—Krause-Testing Machine Co., 573 11 Ave., 1 story factory, office, to W. P. Schirtzinger, 491 E. Dunedin St., **$40,000.** Awarded 8/30.

O., Columbus—FACTORY—Timken Roller Bearing Co., 1025 Cleveland Ave., 1 story, brick, steel, concrete factory, adjacent present plan, to The Hadlock Krill Co., 2169 E. 33 St., Cleveland, **$175,000.** Awarded 8/30.

Pennsylvania—PUMPING STATION—Industrial Company, 1 story, bsmnt., 57x72 ft. brick pump, station, to Navarro Corp., 6219 Broad St., Pittsburgh. Est. between **$50,000-$100,000.**

R. I., Bristol—PLANT—Bristol Mfg. Corp., Wood St., electrical contract 1 story, 230x290 ft brick plant, to Scannevin & Potter, 75 Westminster St., Providence. CD 7/20—ENR 7/23, under CA.

R. I., Providence—FREIGHT TERMINAL—Southern New England Terminal, Okie St., electrical contract 1 story, 135x150 ft. freight terminal, to Crawford Electric Co., 580 Charles St. Awarded 9/2. CD 8/6—ENR 8/13, under CA.

Utah, Magna—POWER PLANT—Utah Copper Co., Geo. Earl, ch. engr., Kearns Bldg., Salt Lake City, brickwork new central power plant, to Ralph E. Child Co., Springville, approx. **$100,000.**

Utah, Salt Lake City—PLANT—Utah Fire Clay Co., 1078 S. 1st West St., reconstructing Unit 2, to Bowers Building Co., 1033 S. State St. Est. **$125,000.** C. Scott, Dooly Bldg., archt.

Wis., Milwaukee—FACTORY—Karr Mfg. Co., Inc., 1825 S. Kinnickinnic Ave., electrical work for remodeling 4 story, 43x100 ft. factory, 11x20 ft. boiler room addn., to Findlay Electric Co., 232 E. Warnimont Ave. R. A. Sutherland, 259 E. Wells St., archt. CD 8/3—ENR 8/13, under CA.

Wis., Milwaukee—FACTORY—Milwaukee Tool & Die Co., 3411 W. Hopkins St., electrical work for 1 and 2 story, 85x120 ft. factory and office bldg., to Reliance Electric Co., 1105 W. Vliet St. CD 6/30—ENR 7/2, under CA.

Wis., Milwaukee—PLANT—Wisconsin Cuneo Press, Inc., 247 E. Chicago St., electrical work for 1 story, 80x150 ft. printing plant and office bldg. addn., to Geo. F. Rohn Electric Co., 2422 W. Clybourn St., and S. P. Electric Co., 3709 N. 27 St. CD 9/1—ENR 9/3.

N. S., Shelburne—PLANT—Vitamin Products, Ltd., Shelburne, plant, day labor. **$40,000.**

Ont., Port Hope—FURNACES, etc.—Eldorado Gold Mines, Ltd., 80 W. King St., Toronto, 5 smelting furnaces, 39x55 ft. brick mine bldg. addn., concrete fdn., day labor. **$50,000.** CD 7/16.

Ont., Thorold—PLANT—Ontario Paper Co., Ltd., Allanburg Rd., plant, to Aiken & McLachlan, Ltd., 9 Queen St., St. Catharines, about **$386,000.** CD 7/14—ENR 7/16.

Wis., Appleton—MACHINE SHOP—Auto Welding Co., Appleton, general contract machine shop addn., to Oscar Boldt Constr. Co., Inc., 217 S. Badger St.; electrical contract, to Superior Electric Co., Appleton.

★**Ont., Toronto**—PLANT—John Inglis Co., Ltd., 14-24 Strachan Ave., plant for Breu gun assembly, Strachan Ave. near Ordnance St., to A. W. Robertson, Ltd., 57 Bloor St. W., about **$500,000.** Allward & Gouinlock, 57 Bloor St., archts.

Ont., Welland—PLANT—Electro Metallurgical Co., Main St., plant, own forces. **$50,000.** CD 1/16—ENR 1/22.

Que., Lachine—BOILER SHOP, etc.—Dominion Bridge Co., Ltd., 1 Ave., 55x80x160 ft. boiler shop, crane runway, etc., to Richard and E. J. Ryan, Ltd., 1808 William St., Montreal, about **$85,000.**

Que., Lennoxville—PLANT—Union Screen Plate Co. of Canada, Ltd., 7 Main St., 1 story, 36x125 ft. plant addn., concrete fdn., to J. A. Verrett Ltd., 76 Marquette St., Sherbrooke. CD 2/27—ENR 3/5.

Que., Montreal (St. Henry)—PLANT—Owner, c/o W. K. G. Lyman, archt., 2058 Victoria St., Montreal, plant addn., to J. L. E. Price & Co., Ltd., 680 Sherbrooke St. W., Montreal, about **$44,000.**

Que., Shawinigan Falls—PLANT—Shawinigan Chemicals, Ltd., 107 Craig St. W., Montreal, plant welfare bldg., to A. F. Byers Constr. Co., Ltd., 1226 University St., Montreal, about **$75,000.** CD 8/21—ENR 8/27.

Que., Temiskaming—PULP STORAGE, etc.—Canadian International Paper Co., Ltd., H. A. Leblanc, secy., South Temiskaming, pulp storage bldg., converting hospital into dwellings for Town of Temiskaming, to Bennett-Pratt, Ltd., 30 Bloor St. W., Toronto, Ont., **$45,000.**

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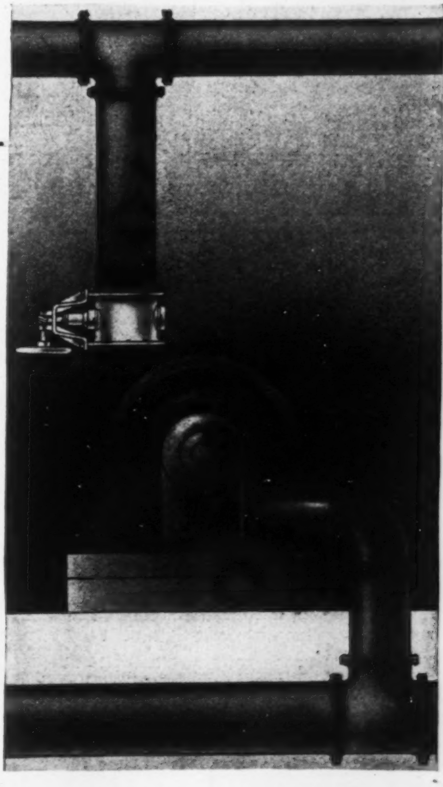

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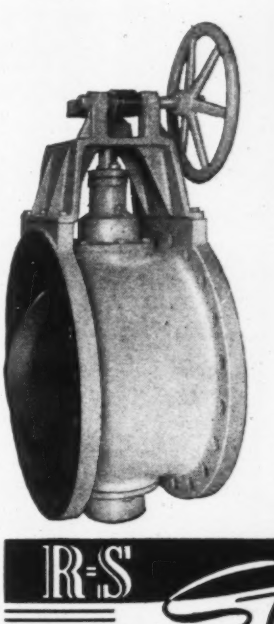

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Project Auditor experienced on large Government construction, willing to work anywhere in continental United States. State complete qualifications, references, salary, experience, etc.

P-955, Engineering News-Record
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to supervise Vacuum Processing of concrete on large construction Projects. (Full pay during training period). Permanent connection and opportunity for advancement for right man. Must be willing to travel. Write giving age & experience.

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Personnel man with accounting background in construction industry, preferably with experience on large Government construction. Must be willing to work anywhere in continental United States. State complete qualifications, references, salary, experience, etc.

P-954, Engineering News-Record
330 W. 42nd St., New York City

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These Positions Vacant advertisements are published subject to agreement by the advertisers not to consider applicants now employed on war work unless they obtain written release from present employer.

STRUCTURAL DETAILERS, accurate and fast workers for Mill buildings and Bridges. Steady work with plenty overtime. State experience and rate. Summer Engineering Co., 239-4th Ave., Pittsburgh, Pa.

CONSTRUCTION SUPERINTENDENT for Housing Project and other general construction. Experience and references required in application. Liberal salary. Application confidential. P-972, Engineering News-Record, 520 N. Michigan Ave., Chicago, Ill.

WANTED—Administrative Assistant to Project Manager on large naval defense construction work in West Indies. Knowledge of all types of construction desirable. Duties, chiefly an office position involving the handling of detailed administrative matters and correspondence. Give resume of experience and salary requirements. P-31, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

ENGINEER thoroughly familiar with contractor's equipment, mainly inspecting, appraising and renting shovels, single and combination units, wanted as expediter for leading position in developing enterprise. P-40, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

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EXECUTIVES AND TECHNICAL MEN. Qualified candidates desiring $2,000 to $20,000 positions may contact employers through our confidential services. Established 27 years. The National Business Bourse, 20 W. Jackson Blvd., Chicago.

POSITIONS WANTED

CHIEF ACCOUNTANT—Office and Personnel Manager. 48 years old, 20 years construction experience. Available at once. Will travel. Experienced Defense Plant Corporation. Federal Housing, Army and Navy procedures. G. P. Rauscher—Apt. 706, 1205 Sherwin Ave., Chicago.

EXECUTIVE MANAGER, engineer of wide experience — difficult construction, docks, bridges. many years. Chief engineer for contractor. Available shortly. Age 58. North American only. PW-991, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

CONSTRUCTION ENGINEER. Graduate, registered, engineer, 44 years old. Over 20 years experience on the design and construction of water supply, sewage, tunnel, railroad, hydroelectric, industrial and building projects. For the past 10 years have directed own engineering-contracting organization which is being disbanded for the duration. Can organize and take charge of construction activities and produce satisfactory results. Available about September 15 for responsible position on defense construction PW-996, Engineering News-Record, 520 N. Michigan Ave., Chicago, Ill.

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SW-984, Engineering News-Record
520 No. Michigan Ave., Chicago, Ill.

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Send Us Your Qualifications and Salary Requirements

Applicants now on Defense Work must be able to obtain necessary releases before acceptance by our company.

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Every advertisement printed in the Searchlight Section is duly authorized.

You can help keep our readers interested and get better returns to your advertising in this section if you acknowledge each reply—in plain envelopes, if you wish.

Departmental Staff

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